



2021 Annual Monitoring Report


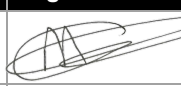

**Operating Stoney Creek Regional Facility
ECA No. A181008, Sewage ECA No.
5400-7DSSHU, PTTW No. 6543-9ZGNU5**

GFL Environmental Inc

30 June 2022

→ **The Power of Commitment**



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1. Introduction

The GFL Environmental (GLF) Operating Stoney Creek Regional Facility (Site or Operating Facility) is located in the City of Hamilton (City) at the northwest corner of the intersection of Mud Street and Highway 20, as indicated on Figure 1.1. Figure 1.2 illustrates the Site layout on a recent aerial photo of the Site and its surroundings.

Waste disposal operations at the Site operates under Environmental Compliance Approval (ECA) No. A181008, which was issued on September 6, 1996, by the Ontario Ministry of the Environment, Conservation, and Parks (MECP). The MECP most recently provided a major amendment on October 31, 2019 and a minor amendment on February 3, 2021 (Amended ECA). A copy of the ECA and available amendments (including the Amended ECA) are included in Appendix A.

In October 2021, the Closed and Operating Facilities were sold from Revolution Landfill LP (Terrapure) to GFL Environmental Ltd. (GFL). Both Site's ECAs are in the process of being updated to reflect the new owner/operator. The 2022 Annual Report will be updated to reflect the amended permits.

The MECP provided the October 31, 2019, amendment, included as Appendix A.6, to approve an expansion of the Operating Facility. The Amended ECA defines the Site as a 59.1 ha (146 acre) landfill site within a total site area of 73.9 ha (185.5 acres). The maximum volume of waste and cover materials, excluding final cover, is now 10,180,000 cubic metres (m³). The maximum annual and fill daily rates are now 750,000 tonnes and 8,000 tonnes, respectively. The February 23, 2021, amendment incorporated final cover approval into Schedule A.

In addition to ECA No. A181008, operations of the Stormwater Management Pond is governed by SWM Pond - Industrial Sewage ECA No. 5400-7DSSHU. Compliance with ECA No. 5400-7DSSHU is discussed in Section 4.5, below. Water taking at the Site via the groundwater remedial systems are largely used to manage the impacts of the Closed Facility. These takings are regulated by Permit to Take Water (PTTW) No. 6543-9ZGNU5. As these systems are meant to control Closed Facility impacts, the reporting requirements of the PTTW are discussed in the Closed Facility Annual Monitoring Report¹. Readers are referred to that document to review the details of the assessment of the effectiveness of the control systems in operation. This report provides some brief discussion of the control systems that are located within the Operating Facility only. For reference, copies of the ECA No. 5400-7DSSHU and PTTW No. 6543-9ZGNU5 are included in Appendix A (Appendices A.7 and A.8 respectively).

As illustrated on Figure 1.1, the Site is adjacent to the Closed Stoney Creek Regional Facility (Closed Facility). Both facilities were former quarries and have extensive, overlapping monitoring networks, as shown on Figure 1.2. Historically, the Closed Facility accepted solid non-hazardous industrial, commercial, and institutional waste (IC&I), that was not accepted at municipal landfills in the region.

The Closed Facility reached capacity in 1995. To establish and operate a landfill within the east quarry (now the Operating Facility) completion of an environmental assessment (EA) was required in accordance with the Environmental Assessment Act (EAA). The EA process began in May 1992 and ended in July 1996 with approval to proceed with the undertaking to establish and operate a landfill site within the eastern quarry. A copy of the EA may be found in the document entitled, "Proposed East Quarry Landfill Environmental Assessment - Executive Summary". Relevant historical documents and reports are provided in Appendix B.

1.1 Report Objective

The object of this report is to satisfy the reporting conditions outlined in the October 31, 2019, Amended ECA. Section 14.0, Reporting, requires that:

"By June 30th of each year, an annual report on the use, operation, and monitoring of the Site during the previous calendar year shall be submitted to the District Manager." The report is to include the following:

¹ 2021 Annual Report – GFL Environmental Closed Stoney Creek Regional Facility, GHD June 30, 2022

- a. the results and an interpretive analysis of the results of all air, ground water, surface water, landfill gas, noise and leachate monitoring including:
 - i. the adequacy of the monitoring programs and recommendations for any modifications to programs as appropriate;
 - ii. the extent to which the monitoring results indicate compliance with the conditions of this Approval [Amended ECA No. A1818008], Provincial Water Quality Objectives (PWQOs), Ontario Drinking Water Objectives (ODWO), the Reasonable Use Guideline (RUG) and any other relevant statutes and guidelines;
 - iii. the trend of the monitoring results with respect to future compliance with the conditions of this Approval, PWQO, ODWO, the RUG and any other relevant statutes and guidelines;
 - iv. the extent or expected future need to implement contingency plans and/or additional mitigation measures to ensure compliance with the Conditions of this Approval, PWQO, ODWO, the RUG and any other relevant statutes and guidelines; and
 - v. an impact assessment of the landfill approved under Approval No. A130404 (Closed Newalta [Stoney Creek]) (i.e., the Closed Facility – now GFL) on the Site.
- b. Site plans showing:
 - i. existing contours of the Site;
 - ii. areas of landfilling operation during the reporting period and areas of intended operation during the next reporting period;
 - iii. areas of excavation during the reporting period;
 - iv. the progress of final and interim cover application; and
 - v. previously existing Site works, works installed during the reporting period, and works planned for installation during the next reporting period.
- c. The results of on and off Site noise level measurements including a description of the operations at the Site at the time these measurements were conducted;
- d. Calculations of the volume of waste, interim cover and final cover disposed or applied during the reporting period and a calculation of the total volume of Site capacity used during the reporting period;
- e. A calculation of the remaining capacity of the Site and an estimate of the remaining Site life;
- f. A summary of the quantity, source and types of waste received at the Site;
- g. A discussion of any approved changes to the operation, equipment and/or procedures at the Site including their effects, if any, on the sound environment within the local community. If these changes resulted in an increase in noise levels description of the mitigation measures which were taken to reduce the impacts and of the effectiveness of these measures are to be provided. Recommendations respecting any proposed changes in the operation, equipment and/or procedures at the Site and their effects, if any, on the sound environment within the local community with proposed mitigation measures;
- h. A summary of any occurrences or incidents where Amended ECA No. A181008 was not complied with, the reasons for non-compliance and the measures to be implemented to ensure that future non-compliance does not occur;
- i. A list of all complaints and a record of the Owner's responses to such complaints, including a list of complaints filed with Ministry and the City, where such information is reasonably available to the Owner; and
- j. A discussion of any operational problems encountered at the Site and the remedial measures taken including the control of dust and noise.

The amended ECA also outlines the requirement to provide any other information with respect to this waste Site which the Regional Director may require from time to time.

Consistent with previous reporting years, copies of this report are being forwarded to:

- The Public Record of the Environmental Assessment Branch, MECP
- The Medical Officer of Health for the City

- The West Central Regional Director of the MECP
- The Clerk/City
- The Valley Park Community Centre Public Library
- Members of the GFL Liaison Committee (NHLLC)

1.2 Report Organization

The organization of this report is as follows:

Section 1	Introduction - Presents background information, objectives, scope, and organization
Section 2	Additional Conditions - Presents a discussion of additional conditions and compliance status required by the Amended ECA not part of Section 14
Section 3	Site Operations - Presents a review of the operational details from the reporting year including Site development, waste acceptance, remaining capacity
Section 4	Monitoring – Presents the monitoring results and analysis from the previous year including, Site inspections, leachate, landfill gas (LFG), groundwater, surface water, air quality, and noise monitoring
Section 5	Conclusions and Recommendations - Presents conclusions and recommendations based on the results of the previous sections
Section 6	Closure - Closing remarks
Section 7	References - Other documents referenced in the preparation of this report

2. Additional Conditions

Section 1.4 of the Amended ECA states that the Amended ECA does not relieve any person of any obligation to comply with any provision of the EPA or any other applicable statute regulation or other legal requirement. Thus, this report continues to include a 3R review and a long-term study of potential health effects related to the Site (discussed in the subsections below).

For ease of presentation and review, the EAA conditions and compliance status have been summarized in Table 2.1A. A status summary of previous ECA conditions is provided in Table 2.1B. The 2019 Amended ECA requirements and compliance with those requirements are listed in Table 2.1C and are discussed in more detail throughout this report.

In summary, the Operating Facility was in compliance with each of the conditions outlined in the EAA and Amended ECA.

2.1 Financial Assurance

Section 2.0 of the Amended ECA requires that GFL maintain, up-to-date, financial assurances for the Site. The financial assurance was last updated in May 2019 based on the proposed expansion of the Operating Facility. The Amended ECA shows the following financial assurance amounts:

- December 31, 2020 - \$30,539,203.00
- December 31, 2021 - \$31,820,503.00
- December 31, 2022 - \$33,101,803.00

A copy of the financial assurance letter used in the Amended ECA is included in Appendix C.

The Amended ECA requires that GFL update the financial assurances every 3 years, for the upcoming 3-year period. The next update is required on March 31, 2022, and will be presented in the 2022 Annual Monitoring Report.

2.2 3R Review

GFL is required to review 3R's technology every 5 years. 3R reviews were completed in 2011 and 2016. An updated 3R's technology review was completed in 2021 and is included in Appendix D.

2.3 Long Term Study of Potential Health Impacts

As per the approved terms of reference of the EAA, GFL has retained Intrinsic Environmental Sciences Inv. to conduct an annual assessment of the potential health impacts to the neighbouring communities. The 2021 Community Health Assessment Review report is included in Appendix E.

2.4 Community Liaison Committee

The Operating Facility Community Liaison Committee (CLC) was established in compliance with the former ECA amendment issued April 16th, 2008. The committee continues to meet on a quarterly basis. The committee operates based upon established Terms of Reference and Operational Guidelines which are posted on a website established for the purpose of providing information and a link for information transfer with the community. At each meeting, the committee addresses an agenda that includes an update of Facility operational activities, monitoring update, a review of any complaints, the status of any applications pending with MECP and the Heritage Green Community Trust activities.

2.5 Complaints

During 2021, GFL responded to seven odour complaints concerning operations. The complaints are summarized in Table 2.2. The table indicates the nature of the complaint, the investigation conducted by GFL, and the conclusions reached. The complaints were discussed with the CLC at their meetings. The MECP typically reviews GFL's responses to the complaints and provides additional guidance where needed.

3. Site Operations

3.1 Site Development

As part of the EA, a peer reviewed engineered landfill design was developed and was optimized through the assessment process. Approval to proceed with the construction of the first Liner Phase was granted by the MECP on September 6, 1996. Details of the development of the Operating Facility design and proposed operation are contained in the Design and Operations Report² (D&O, Appendix B). Individual phase construction approvals are granted by the MECP following reviewing documentation supplied by an engineering consultant. The approval documents for each phase are maintained at the Site.

3.1.1 Waste Placement

Between June and December 2017, GFL undertook the construction of the Phase 8A liner and leachate collection system (LCS) in the northwestern portion of the Operating Facility. The detailed design and specifications for Phase 8 were submitted to the MECP for review and were approved prior to construction. GHD was retained by GFL to carry

² Taro East Quarry Environmental Assessment Design and Operations Report, Gartner Lee Limited, January 1995.

out construction quality assurance (QA) work and complete documentation to satisfy Conditions 14.3 and 14.4 of the ECA. Construction activities were documented in the 2017 Construction Inspection Report³ included in Appendix F.

Figure 3.1 illustrates the layout of the landfill phases and highlights the location of Phase 8A. Waste placement throughout 2021 was generally focused in the areas in the south of the Site where the final cover was removed and replaced (hatched areas on Figure 3.5).

There was no work completed on the new liner or sections of the LCS in 2021.

3.2 Environmental Control Systems Design

3.2.1 Leachate Collection System

Leachate movement through the landfill base is controlled with low permeability liners and by maintaining an inward hydraulic gradient. The following describes the main leachate controls:

- a) A double liner system built over a layer of granular placed on the quarry floor (Figure 3.2). The double liner system incorporates:
 - i) A composite primary liner consisting of a high density polyethylene (HDPE) geomembrane underlain by a 1.0 metre (m) thick compacted clay liner.
 - ii) A hydraulic control layer (HCL) consisting of a 0.5 m thick layer of clear crushed stone and a series of perforated pipes.
 - iii) A secondary liner consisting of a 1.0 m thick layer of compacted clay.
- b) A LCS is installed on top of the primary liner across the base and side slopes. The LCS consists of a 0.5 m thick layer of crushed stone and a network of perforated pipes.

The double liner system can be operated as a hydraulic trap to control leachate migration. The perforated pipes installed within the HCL along the base and side slopes are connected to the municipal water supply in order to add water to this layer. To remove water from the HCL, submersible pumps can also be connected to the perforated pipes.

Water is not added to the HCL while the Operating Facility is active, thus it is intended to operate in an unsaturated state until Site closure. However, during construction of individual cells, rainfall enters the HCL and flows by gravity for collection at a low point. Liquid encountered in the HCL during construction is sampled and tested for contaminant indicators.

Since 2018, several samples have been collected from the discharge water while the HCL was being dewatered. The results of this sampling are discussed in Section 3.2.2.2.

After the Operating Facility is closed, the HCL will be saturated with water from the municipal supply. The pipes around the perimeter of the Site will be used to monitor and regulate heads within the layer. Maintaining a high level of water in the HCL, relative to the low level of leachate in the Operating Facility, will create an inward gradient. Should the primary liner develop a leak, the water pressure within the HCL will force water into the Operating Facility instead of leachate moving out of the Operating Facility. The perforated pipes within the HCL will also be used to add and remove water from the HCL periodically in order to remove contaminants that may have migrated across the primary liner by diffusion.

Two other Operating Facility components also contribute to the control of leachate:

- a) A groundwater collection system (GCS) installed beneath the secondary liner will control leachate. The GCS consists of a system of trenches filled with clear crushed stone and perforated pipes beneath the base and around the perimeter of the Operating Facility. The GCS is hydraulically connected to the base-grading fill placed

³ 2017 Construction Inspection Report – Phase 8A Base Liner and Leachate Collection System, GHD Limited, April 24, 2018.

beneath the secondary liner. The GCS functions during construction to control shallow groundwater and maintain dry working conditions. After the completion of the liner system the GCS will act as a backup LCS should the liner ever fail.

- b) A final cover constructed over the surface of the Operating Facility will control leachate generation. The final cover will consist of a 0.6 m layer of compacted clay overlain by a 0.15 m vegetated topsoil layer. The final cover will ensure that there is a physical barrier between the waste and will act as a partial barrier to infiltration from rainfall, which will in turn reduce the amount of leachate generated.

3.2.1.1 Monitoring Leachate Collection System Performance

The LCS is monitored using several monitoring standpipes (LS1, LS2, and LS3), located in different phases of the liner system. The standpipes measure leachate levels. LS1 and LS2 were not accessible until August 2018 due to these monitors being located in active filling areas. Until final contours are reached, leachate levels on the liner are also measured at the permanent leachate pumping station and through various manholes, as necessary, by manual readings.

Currently, leachate is collected via an interim leachate pumping station in the east buffer area. Since the interim leachate pumping station is not located at the lowest point of the base liner system (i.e., the permanent leachate pumping station), the current pumping configuration cannot lower the leachate level to less than about 0.47 m above the bottom of the LCS (i.e., HDPE geomembrane liner). During warmer months, a temporary pump is installed in the permanent leachate pumping station to further reduce leachate levels.

The table below provides a summary of the available leachate levels on the liner over the past several years:

Table 3.1 Range of Leachate Head on Liner and Leachate Depth

Location	Year			
	2018	2019	2020	2021
LS1 – Head on Liner	0.0 – 0.1	0.0 – 0.09	0.08 – 0.15	0.06 - 0.78
LS1 – Leachate Depth	17.10 – 17.11	17.02 – 17.11	22.33 – 22.40*	21.7 – 22.42
LS2 – Head on Liner	0.07 – 0.12	0.08 – 0.88	0.37 – 1.13	0.97 – 1.78
LS2 – Leachate Depth	13.77 – 13.82	12.72 – 13.81	12.22 – 12.98	11.57 – 12.38
LS3 – Head on Liner	0.00 – 0.97	0.00 – 0.92	0.02 – 0.81	0.19 – 1.06
LS3 – Leachate Depth	14.41 – 15.38	14.46 – 15.38	14.57 – 15.36	14.32 – 15.19
Leachate Sump	0.19 – 3.34	0.19 – 3.17	1.92 – 3.77	1.73 – 3.58
Notes: * The riser on LS1 was raised approx. 5.3 m to facilitate final approved elevations LS3 was inaccessible during much of 2020 and 2021				

It is important to note that the levels measured at the Leachate Sump are at the lowest point of the LCS and are not indicative of leachate levels over the entire Site. Monitoring conducted at various other locations (e.g., LCS cleanout structures) located upgradient of the permanent leachate pumping station show that leachate depths are much shallower over the remainder of the Site.

A comparison of leachate levels between 2018 and 2021 at LS1, LS2, and LS3 show levels have been generally comparable at LS3 but showed some increases at LS1 and LS2 over the past three years. Several measurements are noted above 0.5 m of head on the liner system. Leachate head was over 0.5 m at LS2 throughout 2021. A similar trend was observed in 2020.

In August 2021, GFL flushed the leachate collection system in the vicinity of LS2 but had little success. Flushing resulted in a blockage that held leachate/water following the maintenance. LS2 was flushed out again in May 2022

which was successful in clearing the blockage and lowering the leachate head on the liner. Following the 2022 flushing, leachate head at LS2 was less than 35 cm (this will be reported on more thoroughly in the 2022 Annual Monitoring Report).

It is recommended to continue pumping operations to limit the head of leachate on the liner. Continued construction of final cover will also help to reduce leachate generation. Leachate levels should be maintained as low as possible in order to minimize the head and the hydraulic gradient on the liner.

Leachate is currently discharged to the City's sanitary sewer under Mistywood Drive. In the future, it is intended that leachate from the Operating Facility will be pumped into the new trunk sanitary sewer which is currently under construction along Highway 20 (Centennial Parkway).

In addition to monitoring the leachate levels on the liner, the Site's ECA requires biennial internal camera inspection of the leachate collection pipes. This examination was conducted by Pipe Flo Contracting Corp in 2021 (Appendix G) and is intended to identify the degree of blockages, if any, of the lateral piping. The leachate blanket outside of the leachate collection pipes is the primary conduit to convey leachate to the pumping station. It is important to maintain good condition of the leachate collection piping as a backup to the collection blanket. Overall, the leachate collection pipes were found to be free flowing. No obstructions were noted during 2021.

3.2.1.2 Monitoring Leachate Quality

The results of the leachate quality monitoring are presented and discussed in Section 4.2.

3.2.2 Liner System

The liner system is comprised of various engineered systems that require routine monitoring to ensure their proper operation. A monitoring program has been developed to provide assurance for the liner system components.

3.2.2.1 Monitoring Liner System Performance

Two diffusion test pads monitored the potential migration of contaminants through the liner using electrical conductivity (EC) probes. The first test pad, D1, was located in Phase 2 but was decommissioned to construct Cell 5A. The second test pad, D2 (shown on Figure 1.2 and in plan-view on Figure 3.3), is instrumented in Phase 1A to provide information along a vertical profile through the liner system. Test pad D2 consists of the following:

- Three EC probes within the primary and secondary liners (situated above one another)
- A LCS monitoring station situated over the EC probes
- A sampling probe within the HCL
- A sampling probe beneath the secondary liner

Trends in EC are examined to monitor for contamination migration. A pattern of increasing EC starting at the probe closest to the leachate and moving downward would be an indication of potential contaminant migration from the Operating Facility. These measurements, along with other indicators, assist in determining the performance of the liner.

EC measurements are collected quarterly at the D2 test pad location. The configuration of the D2 diffusion test pad is illustrated on Figure 3.3. Consistent with ECA requirements, EC measurements were collected from the resistivity probes at D2 on four occasions during 2021, in March, June, September, and December from the upper primary liner and lower secondary liner probes. The measurements from the probes have been tabulated and are presented in Table 3.2 and are presented graphically on Figures 3.4A and 3.4B. A variety of factors affect the values recorded at the probes including variations in monitoring probe construction, clay compaction, variations in clay mineralogy, grain size, and moisture content that naturally occurs during construction.

Past data collected from PH2-2, PH2-3, and to a lesser extent, PH2-1 and PH2-6 were variable, with several spikes in soil conductivity recorded between 2012 and 2017. Figures 3.4A and 3.4B show consistent conductivity reading since late 2017/early 2018. The reason for the historic spikes is unclear; however, the overall, general trend is consistent

conductivity values. In summary, the pattern of monitoring results at this location does not suggest leachate migration through the liner.

3.2.2.2 Hydraulic Control Layer Monitoring

Confined between the two compacted clay liners is the HCL, which consists of a half-meter layer of 50 millimetre (mm) clear stone. Following closure of the Operating Facility, this layer will be charged with municipal water to maintain an inward gradient.

The HCL is examined each time a new liner cell is constructed, and the temporary berm is excavated to allow the connection of the existing HCL to the new section. On occasion, water may enter the HCL due to precipitation on exposed areas during the construction of new sections of the liner.

Pumping of water from the HCL was initiated during the construction of the Phase 8A base liner system in 2017 and has continued on an occasional basis ever since. Water collected from the HCL is being pumped back into the contained landfill and is ultimately discharged as leachate to the sanitary sewer.

Table 3.3 details the 2018 through 2021 analytical results from the samples collected from the HCL during pumping. The analytical results are generally consistent with one another and are characteristic of the background groundwater within the Eramosa Dolostone and do not indicate leachate impacts within the HCL.

3.2.2.3 Base Grading Layer Monitoring

A layer of crushed stone is placed directly on the quarry floor in order to provide an even slope on which the base liner system is constructed. This layer also serves to conduct groundwater away from the liner and construction area in order to maintain dry working conditions. This layer is connected to the GCS. Liner construction has progressed to a level where the GCS no longer needs to be pumped to maintain dry working conditions for liner installation.

3.3 Site Operations

This section describes the day-to-day operations of the Operating Facility.

3.3.1 General Operations

The Operating Facility is operated in accordance with the terms and conditions of ECA No. A181008. Waste is received between the hours of 7:00 a.m. and 5:00 p.m., Monday to Friday. The operational hours of the Site are between 6:30 a.m. and 6:00 p.m., Monday to Friday. The site is closed on weekends, and statutory holidays. During non-operating hours the entrance and exit gates are locked or secured by an independent security firm.

The Landscape Plan for the site was approved in 1997 and completed in 1998. General landscape maintenance continued throughout 2021. No major landscaping activities were completed during the current reporting period.

3.3.1.1 Access Roads

Sections 5.13 through 5.16 of the Amended ECA provide conditions for access to the Site. In compliance with the Amended ECA, GFL continues to encourage trucks to enter the Site via Upper Centennial Parkway (Highway 20) and exit onto First Road West southerly to Mud Street. Under the approved configuration, the entrance and exit will not have to be moved prior to Site closure.

GFL ensures Site access roads are free of dirt and waste. To maintain these conditions, GFL continues to maintain equipment on-site including a sweeper and water truck for dust control as well as a front-end loader for general maintenance. The automated wheel wash system continues to be operated, with wash water directed to the sanitary sewer for disposal. In addition, a hand wand system or an independent mobile wash company is utilized when the automated facility is not in operation due to weather or maintenance situations.

3.3.1.2 Vermin Control

The Operating Facility does not accept putrescible wastes and therefore bird and rodent problems do not occur. As such, counter measures for these nuisances are not required.

3.3.1.3 Litter Control

GFL takes all reasonable steps to prevent off-Site, wind-blown, litter impacts. Litter control is undertaken as part of GFL's daily inspection program and whenever it is required.

3.3.2 Waste Acceptance

3.3.2.1 Waste Types

Requirements of the Amended ECA dictate that waste acceptance is limited to solid, non-hazardous, commercial, institutional, and industrial wastes, including petroleum-contaminated soils. No liquid industrial, hazardous, or putrescible wastes are accepted.

The Amended ECA also provides allowance for accepting non-hazardous incinerator ash and asbestos waste provided handling and landfilling is done in accordance with Sections 6.3 through 6.12. Section 6.17 provides conditions for landfilling sludge at the Site. Section 6.18 of the Amended ECA states that waste generated within the Province of Ontario can be received directly at the Facility. This Waste receipts maintained by GFL indicate that all wastes received were generated from within the specified service area.

3.3.2.2 Wastes Accepted

The Amended ECA limits the quantity of waste received at the Operating Facility to a maximum of 750,000 tonnes in any consecutive twelve month period, with a maximum of 8,000 tonnes and/or 250 waste trucks in any one day. The maximum approved volume of waste and daily/interim cover at the Site is 10,180,000 m³.

The table, below, presents a summary of wastes received into the Site during 2021. The results are based on records maintained by GFL. The table displays waste sources, waste types, and the total tonnage from each source, as well as a total tonnage for the entire year.

The total tonnage received for the year 2021 was 534,586.67 tonnes.

GFL's records indicate that the maximum tonnage in any one-day occurred on November 23, 2021 and was 5,449.51 tonnes. The maximum number of loads per day occurred on December 22, 2021, with 210 loads.

Table 3.3 2021 Waste Acceptance

Waste Source	Waste Types	Total Tonnage
Dofasco	Approved Mixed Waste	21,538.12
	B.O.F. Oxides	52,513.92
Interfacility Operations	Non-Haz Solid Industrial	172,320.09
Other Sources	Non-Haz Contaminated Soil	200,856.06
	Non-Haz Solid Industrial (C&D)	519.59
	Asbestos	4,214.87
	Non-Haz Solid Industrial	82,624.02
Total		534,586.67

As presented on Figure 3.5, approximately 290,715 m³ of landfill capacity was consumed between January 2021 and January 2022. The remaining capacity at the Site is estimated to be approximately 3,027,900 m³, which corresponds with a remaining Site life of approximately 12.1 years based on an average receipt of 250,000 m³ of waste per year.

3.3.2.3 Waste Control Procedures

Prior to receipt at the Operating Facility, all wastes are subjected to GFL's Waste Control Procedures. These procedures are summarized as follows:

- Waste streams are required to meet all of the conditions specified in the Amended ECA.
- Waste stream testing is carried out at the generator's site by a qualified technician. The test results must be reviewed and approved by GFL prior to approval for shipment.
- Waste loads entering the Site are accompanied by a waybill from the generator to ensure that the waste stream has valid approval.
- Qualified Site staff visually inspects the unloading of wastes.
- Waste stream records including waste description, analytical testing, and waybills, are maintained on Site for a period of at least 2 years for MECP inspections.

The waste control procedures also list those wastes that are unacceptable to be landfilled at the Site. A complete description of these procedures can be referenced in Appendix 10-A of the '*East Quarry Landfill Maintenance and Operations Manual*' included in Appendix B.

To control the volume of wastes received at the Site, GFL calibrates the weigh scales on an annual basis. In 2021, Avery Weigh-Tronix Canada completed the calibration. The results are included in Appendix H.

3.3.2.4 Waste Rejection

After review of the waste profile information and the corresponding analytical data, if the material does not meet GFL's acceptance criteria then the material will not be approved for disposal. The scale operator verifies each load upon arrival at the Site to ensure that the material complies with GFL's receipt requirements and, if rejected, loads are returned to the generator.

As part of GFL's waste control procedures, incoming wastes are randomly sampled for compliance. Sampling may take place at the site of origin, GFL's processing facilities or at the Site. Waste loads or piles that are subjected to compliance sampling are isolated until the compliance results are received, and the material is deemed acceptable. Wastes that do not comply are rejected and returned to the generator. Rejection records with accompanying information are retained on Site for a period of at least two years. A total of 15 loads were rejected during 2021. Table 3.4 lists the load rejections for 2021.

3.3.2.5 Waste Placement

During 2021, landfilling of waste was generally focused on the areas in the south of the site where the final cover was removed and replaced. Upon arrival at the Site, waste trucks are weighed, and appropriate paperwork is exchanged and recorded. The Site supervisor then directs the truck to the active working area of the Facility. Figure 3.5 presents the material contours based on an aerial survey conducted in early January 2021.

3.3.3 Operational Review

3.3.3.1 MECP Site Inspections

There were no MECP site inspections completed in 2021.

3.3.3.2 Odour Control Issues

Odour continued to be controlled and monitored during 2021. Consistent with previous years, primary means of odour control is to bury odourous waste as quickly as possible with non-odourous waste. When necessary, additional odour control is achieved through the use of a dosing system applied to the leachate at the interim leachate pumping system and through the aeration system located at the equalization basin.

4. Monitoring

The following subsections present the current monitoring data to address the monitoring requirements of Section 12.0 of the Amended ECA. The results and interpretation of the required monitoring programs include Site inspections, leachate production and quality, surface water, landfill gas (LFG), groundwater, air quality, and noise monitoring programs.

GFL technicians perform all Site inspections, and LFG monitoring. Groundwater and surface water monitoring and sample collection is primarily completed by GFL technicians with occasional assistance from GHD field staff.

Sample analysis was conducted at BV Laboratories (a CAEL accredited laboratory using approved methodologies and Quality Assurance/Quality Control [QA/QC] protocols). All samples are delivered on-ice, to BV Laboratories using chain-of-custody protocols.

Specialized air quality sampling/analysis and noise monitoring was contracted to Rotek Environmental Inc. (Rotek).

All of the inspection and monitoring programs performed in 2021 fulfilled or exceeded the requirements stated in the Amended ECA.

4.1 Site Inspections

Site inspections and maintenance activities for the engineered control systems of the Operating Facility, as required by *Schedule B* of the ECA were undertaken and recorded by GFL. These inspection reports (Daily, Weekly, Monthly, Quarterly, Semi-Annually, and Annual) are summarized in Appendix I. All Site inspection records are retained on-Site for a minimum of 2 years and are available upon request for inspection by the MECP.

4.2 Leachate Production and Quality

Similar to previous years, during 2021, all leachate was managed by pumping leachate through a forcemain to an equalization basin on the Closed Facility property. From there the leachate is metered and discharged into the City's sanitary sewer under Mistywood Drive.

The leachate monitoring program, outlined in *Schedule C* of the Amended ECA, is implemented sequentially as the development of the Site progresses. The Operating Facility leachate was sampled quarterly in 2021 as per the Amended ECA. The analytical results for 2021 are included in Appendix J.1, along with the daily volume of leachate removed from the Site in Appendix J.2.

The following table presents a summary of the maximum, minimum and current concentrations of key leachate indicator parameters.

Table 4.2 Leachate Quality – Key Parameters

Parameter	Current (2021 Average)	Minimum – Maximum (1997-2021)	Closed Facility Leachate (2021 Average)
Alkalinity	2,950	169 – 3,800	361.23
pH (std. units)	8.27	7.2 – 11	9.74
Conductivity (µS/cm)	14,000	2,650 – 21,620	3,194.1
Phenol (µg/L)	0.76	0.002 – 8.5	1.17
Chloride	2,675	280 – 5,010	427.71
Magnesium	68.5	15 – 498	6.19
Cl/Mg (unitless)	38.4	0.87- 93	1,069.43

Table 4.2 Leachate Quality – Key Parameters

Parameter	Current (2021 Average)	Minimum – Maximum (1997-2021)	Closed Facility Leachate (2021 Average)
Sulphate	142.25	40 – 6,190	291.95
Sodium	1,950	1 – 4,250	284.28
Potassium	1,325	9.56 – 2,800	97.4
Ammonia	195	0.22 – 270	18.13
Strontium	4.9	0.3 – 11	0.62
NH3/Sr (unitless)	40.83	0.06 – 71	59.9
Molybdenum	0.28	0.17 – 15.5	0.18
Iron	0.70	0.50 – 1,420	5.54
DOC/TOC	385	1.08 – 490	77.2
TKN	237.5	169 – 3,800	20.1
Notes: Units are in milligrams per litre (mg/L) unless noted otherwise			

Leachate at the Operating Facility is characterized by elevated alkalinity, EC, phenols, chloride, sodium, potassium, iron, molybdenum, total ammonia and total Kjeldahl nitrogen (TKN) in comparison to background water quality and are typical indicators of leachate derived from similar waste streams. Leachate concentrations in the Operating Facility are generally more elevated in comparison to the Closed Facility; however, similar parameters are found at elevated concentrations in both Facilities. This is expected given that the type of waste landfilled in both Facilities are very similar.

Concentrations of organic compounds found in the leachate are expected to remain relatively low due to the low input of organics in the incoming waste. Similar to previous years, in 2021, several volatile organic compounds (MEK, MIBK, acetone, BTEX, and MTBE) and semi-volatile organic compounds (1-methylnaphthalene, 2,4-dimethylphenol, isomers of methylphenol, naphthalene, and phenol). Also detected were low concentrations of fatty and resin acids, mineral oil and grease and animal/vegetable oil and grease. These compounds have been present previously. Similar parameters were detected at similar low-level concentrations during recent past monitoring events. Again, similar to previous years, no polychlorinated biphenols (PCBs) were detected in 2021.

The Operating Facility leachate is contained and is ultimately directed to the sanitary sewer. As described in Section 3.2, the Operating Facility is fully lined with an HCL. Results from the HCL are plotted with the leachate results in Appendix J.3. The plots show very different quality and thus, results do not indicate any leakage of leachate from the overlying waste into the HCL.

4.3 Landfill Gas Monitoring

The LFG monitoring program has expanded as additional Facility cells are constructed. Monitoring began in 2003 after the installation of sidewall liner in the vicinity of Cell 1, and subsequently in Cell 3. The program currently consists of 10 monitors; however, GE6 was buried and inaccessible after 2017.

The engineered liner system is constructed such that it presents a physical barrier to the movement of any landfill gases. In addition, the Operating Facility is not yet completely capped and therefore the path of least resistance for the movement of gas from the Facility is upwards through the waste to the surface where it vents naturally to the atmosphere.

The first 2 years of monitoring did not detect any combustible gas and therefore the frequency as stipulated in the ECA, *Schedule E*, was reduced to once per month.

The current landfill gas monitoring data is presented in Table 4.2.

No significant landfill gas had been detected at any of the monitors between December 2012 and 2021.

Landfill gas levels are not significant enough to warrant further action at this time; however, continued monitoring is recommended.

4.4 Groundwater

4.4.1 Regional Groundwater Flow

Both the Closed and the Operating Facilities are located in fractured bedrock of the Niagara Escarpment within mined out dolostone quarries that are underlain by a sequence of shale and dolostone of the Lockport and Clinton Formations (each of the Formations consist of several Members and individual flow zones).

Weathering and erosion by continental glaciation has contributed to the removal of some rock units near the escarpment, creating the Eramosa Escarpment and has covered most of the area with a veneer of unconsolidated overburden sediments. Groundwater beneath the Closed and Operating Facilities flows through the thin overburden sediment, where it exists, as well as the underlying bedrock.

In general, regional groundwater flow in the Hamilton area is divided between flow towards Lake Ontario, and flow towards the south following the orientation of the bedrock dip. The location of the groundwater divide varies and can be up to 5 kilometres (km) south of the escarpment brow (Heagy, 1995).

The regional groundwater flow system near the Operating and Closed Facilities is characterized by groundwater movement from the southeast to the northwest towards the Niagara Escarpment. Prior to the development of the quarries, groundwater flow in each of the identified flow zones would likely have been uniformly in the same direction, towards the northwest.

As groundwater in each flow zone approaches the Niagara Escarpment, there are larger and more interconnected fractures, which increases permeability. Groundwater begins to move downwards, resulting in groundwater flowing into deeper formations prior to reaching the edge of the escarpment. Only a few springs are evident on the face of the escarpment where groundwater has become perched within the lower dolostones and shales. Groundwater that flows beyond the base of the escarpment eventually discharges into Lake Ontario.

4.4.2 Local Groundwater Flow

To illustrate local groundwater flow zones, Figure 4.1 provides a Site plan with a cross-section location line in relation to the monitoring well network. Figure 4.2 shows the groundwater flow zones in a cross-section drawn through the Closed and Operating Facilities. Groundwater movement within these zones is strongly influenced by local physical features and man-made influences, as well as the remedial measures implemented to control groundwater impacts from the Closed Facility.

Groundwater flows within five flow zones identified beneath the Site. The table below provides an overview of the flow zones.

Table 4.3 Hydrogeologic Flow Zone Descriptions

Flow Zone	Lithological Unit	Comments
Shallow Water Table Flow Zone	Overburden materials Eramosa Dolostone	The Eramosa Dolostone and Vinemount Formation were eroded north of the Closed Facility, along the line of the Eramosa Escarpment. The Eramosa Dolostone was removed by historical quarrying. Waste was landfilled in this zone at the Facility.

Table 4.3 Hydrogeologic Flow Zone Descriptions

Flow Zone	Lithological Unit	Comments
Vinemount Flow Zone (VFZ)	Vinemount Formation Consists of 0.5 m layer of dolostone underlain by 4.5 m layer of shale	The Eramosa Dolostone and Vinemount Formation were eroded north of the Closed Facility, along the line of the Eramosa Escarpment. Flow is within the dolostone at top of formation (horizontally permeable).
Upper Flow Zone (UFZ)	Upper portion of the Goat Island Dolostone Consists of 1.5 m layer of interbedded dolostone and shale, underlain by dolostone and 0.7 m thick shale	Terminates at the Eramosa Scarp. Permeability significantly decreases to the southeast.
Mid Flow Zone (MFZ)	Goat Island Dolostone	Two distinct permeable units separated by low permeable rock, leading to the upper mid flow zone (UMFZ) and lower mid flow zone (LMFZ).
Lower Flow Zone (LFZ)	Ancaster Chert Beds	Permeability increase towards the Niagara Escarpment.

4.4.3 Groundwater Monitoring Program

The groundwater monitoring program for the Operating Facility consists of 20 monitoring well nest locations with one or more wells located at each nest. Table 4.4 indicates the monitoring well details of the locations included in the current groundwater monitoring program including the name and flow zone designation for each individual monitor. The table also indicates the frequency of water sample collection, and the accompanying notes indicate the parameter analyses to be conducted once samples are collected. As indicated in the notes, there is an overlap of the monitoring requirements for the ECA and the Permit to Take Water (PTTW). Figure 4.3 illustrates the locations of the current groundwater (and leachate) monitoring locations. As previously noted, the Closed and Operating Facility monitoring programs overlap. Thus, Figure 4.3 includes the locations monitored as part of the Closed Facility program.

It should be noted that the Amended ECA includes a rationalized monitoring program for the Operating Facility. The monitoring program has been rationalized in comparison to previous years in terms of frequency and locations being monitored. However, as the Closed and Operating Facility monitoring overlaps, GFL intends to pursue applying the rationalized monitoring program to the Closed Facility in order to amalgamate the monitoring programs for both sites to a common program. GFL requested this change in writing to the MECP during 2020 with the intention of implementing the rationalized program upon written approval from the MECP. Discussions between GFL and the MECP are ongoing at the time of writing this report.

The frequency and test parameters required for groundwater monitoring were specified in *Schedule F* of the former ECA. The monitoring outlined in the ECA will continue to be completed until the MECP approves the rationalized program.

A complete list of the monitoring installations, including flow zone designations, for all Operating and Closed Facility locations is included in Appendix K (Appendix K.1 lists the locations included in the current monitoring program; Appendix K.2 lists the available historic monitoring details).

4.4.3.1 Monitoring Program Deviations

Table 4.5 provides a list of deviations from the monitoring program (includes deviations from both the Closed and Operating Facility monitoring programs). It should be noted that all monitoring included in the program approved under the recent ECA amendment is included in the monitoring program completed during 2021.

Dewatering completed as part of the Centennial Parkway Trunk Sanitary Sewer (CPTSS) project resulted in lower water levels in all of the flow zones. Many of the flow zones have since recovered; however, previous annual reports recommended to omit select locations due to slow/poor recovery. Access issues combined with lower water levels and

poor recovery due to dewatering are the primary causes of monitoring program deviations. The groundwater seeps located along the Niagara Escarpment have not been sampled since 2016 due to concerns related to the safe access of the seep locations.

4.4.4 Quality Assurance/Quality Control

QA/QC procedures are included in Section 11 of the Maintenance and Operations Manual (Appendix B). For QA/QC purposes, duplicate samples are submitted and analysed. Duplicate samples are submitted to the laboratory using the blind duplicate format. Blind duplicate samples (a duplicate sample given a fictitious number) are submitted to the laboratory along with the other samples to ensure internal reproducibility and accuracy. Blind duplicates are taken so that a representative sample of all flow zones are cross-checked. Sample locations for blind duplicates are rotated each sampling event so that no monitor is duplicated in consecutive sampling events. About 10-15 percent of the samples collected are duplicated.

QA/QC procedures are included in the Standard Procedures used for collecting and submitting groundwater samples to the laboratory.

All analytical data received were reviewed and the data was deemed acceptable for use in this report. Any deviations between original and duplicate samples are not interpreted to significantly alter the reliability of the data or affect the conclusions provided in this report.

An assessment of the field duplicate sample results are included in Appendix L. Field duplicate results were evaluated using a relative percent difference (RPD) approach. Field duplicates were acceptable, except for the qualifications noted in Appendix L.

Field notes and pre-purge records are kept and are included in Appendix L. Appendix L also include copies of the original laboratory certificates of analysis.

4.4.4.1 Monitoring Network Modifications

In late 2018/early 2019, GFL completed several drilling programs that included abandoning and replacing monitoring well locations, abandoning unused containment and observation wells, repairing several damaged monitors, and installing additional background wells. Monitoring wells installed in 2018 and early 2019 were developed and incorporated into the regular monitoring program. In 2020, P7-I was replaced, and LS-1 was extended to accommodate additional waste placement.

All of the newly installed and repaired monitoring locations were geodetically surveyed by GHD field staff on October 7, 2021.

There were no modifications to the monitoring network in 2021.

4.4.5 Groundwater Level Fluctuations

Water level monitoring data and hydrographs for all available monitoring data are presented in Appendix K (Appendices K.3 includes the 2021 water level elevations and K.4 includes individual hydrographs for all monitors). The following subsections provide discussion of the groundwater flow at the Operating Facility.

4.4.5.1 Shallow Groundwater Flow

Shallow groundwater flow near the Operating Facility takes place primarily in the uppermost rock formation, the Eramosa Dolostone, and to a lesser degree in the exposed Vinemount Shale where the Eramosa Dolostone has been removed by historical quarrying and the UFZ (the Eramosa and VFZ pinch out or end at the Eramosa Scarp). Seasonal shallow groundwater also flows in overburden materials north of the Operating Facility where overburden overlies the Goat Island Dolostone/UFZ. Groundwater flow within shallow stratigraphy is complicated by the presence and/or absence of overburden material and the Eramosa Dolostone around the Operating and Closed Facilities.

Shallow groundwater flow was influenced by dewatering for the CPTSS project. GHD understands dewatering activities near the Site were completed in late 2016. The majority of monitoring locations across the Site experienced a decline in water levels during 2016; those closest to the tunnel construction declined to their lowest historical values and were up to 3 m lower than in October 2015. Each of the Shallow Groundwater monitors influenced by the CPTSS largely recovered shortly after dewatering ceased (i.e., in early 2017).

Shallow/Water Table Flow Zone (Eramosa Dolostone Overburden)

The shallow groundwater levels vary, with highs in spring and fall, and lows occurring in the summer. An interpretation of the groundwater flow in June 2021 is presented on Figure 4.4A. The shallow groundwater flow direction is towards the Eramosa Scarp in the northwest, which is consistent with previous years.

Measurements of the shallow groundwater continue to indicate seasonal water level fluctuations, similar to previous years. The shallow groundwater levels varied seasonally, with highs in spring and fall, and lows occurring in the summer.

VFZ (Vinemount Shale)

Groundwater flow during June 2021 in this flow zone is depicted on Figure 4.4B. The flow pattern in June 2021 generally follows the same pattern as period years. Water levels during the reporting period showed a flatter gradient compared to previous years. The area near the Eramosa Scarp is an area with enhanced permeability and recharge. Groundwater levels are higher along the length of the Eramosa Scarp in the Vinemount Formation. Groundwater flow in this area is south-easterly, except where the influence of the drainage channel for the former quarry results in localized diversion of flow. Beneath the central portion of the Closed Facility, groundwater flow in the VFZ is primarily towards the east towards the Operating Facility property. This is due to the anthropogenic disturbances of the VFZ below the Operating Facility (i.e., Shatter Trench, groundwater pumping station, M4 within the Lower Sump area and the Perimeter Drain).

At the Operating Facility, shallow groundwater continues to flow from the Eramosa Dolostone and VFZ into the Operating Facility towards the Groundwater Pumping Station and M4. Wells influenced by pumping from the South Sump and M4 do not show as pronounced seasonal variations, in comparison to shallow wells further from the pumping locations.

The Perimeter Drain has been intermittently operated in the past due to mechanical and electrical issues. As a result, the operation of the Perimeter Drain was put on hold at the end of 2012 and was not operational during the current monitoring period. GFL has focused containment efforts on the operation of the M4 containment, Shatter Trench, and Containment wells.

Measurements of the VFZ groundwater indicate seasonal water level fluctuations. Similar to previous years, groundwater levels were high in spring and fall, and lower in summer.

UFZ (Goat Island Dolostone)

The Upper Flow Zone (UFZ) is comprised of an upper 1.5 m layer of interbedded dolostone and shale, underlain by a competent lower dolostone, and a tight 0.7 m thick layer of shale. The UFZ represents the upper portion of the Goat Island Dolostone and it terminates along the line of the Eramosa Scarp. Examination of rock cores, evaluation of containment system monitoring, and several years of water level monitoring data have demonstrated that the UFZ is most permeable close to the Eramosa Escarpment and far less permeable farther away from the Eramosa Escarpment. GLL previously identified the demarcation line for this change in permeability as the area north and west of a line from monitoring locations 36 to 29 and 48. East of this line, wells recover slowly and therefore are not reliable indicators of potentiometric heads within the flow zone.

Groundwater flow in this zone during June 2021 is depicted on Figure 4.4C. The operation of the containment wells (CW3, CW5R, and CW16) and M4 has an impact on the local groundwater flow within the UFZ. Collectively, these pumping wells drew in approximately 58.8 million litres (L) of impacted groundwater from this flow zone in 2021. Shatter trench well M5R continued to be operated intermittently during 2021. A total of 75,357 L was extracted from

the UFZ (and Upper-Mid Flow Zone discussed in 4.4.5.2) at M5R in 2021. M5A was not operational in 2021 due to low water levels.

In 2016, there was a decline in water levels in the UFZ, which was attributed to rehabilitating the containment wells and the Phase Two CPTSS dewatering. Since 2017, water levels in the UFZ have generally followed trends of slow recovery from the CPTSS dewatering. Locations near the Eramosa Escarpment and Mud Street appeared to be influenced the greatest and continue to recover from dewatering influences. Locations within the lower permeable section of the UFZ show less recovery, as expected.

4.4.5.2 Deeper Groundwater Flow

Deeper groundwater flow beneath the Operating Facility includes the MFZ (UMFZ and LMFZ) and the LFZ.

The UFZ to the south and east, away from the Eramosa Scarp, could be considered part of the deeper groundwater flow (previous reports have included the UFZ in the deeper groundwater flow discussion). However, water quality and recovery from the CPTSS dewatering (see Section 4.4.6) more closely resembles shallow groundwater at the Site and thus, the unit has been regrouped into Section 4.4.5.1.

Similar to shallow groundwater flow, flow within deeper groundwater flow zones have also been influenced by dewatering for the CPTSS construction. Recovery from the dewatering has been slower in the deep flow zones and some influence remains during the current reporting period.

An interpretation of the deeper groundwater flow in June 2021 is presented on Figures 4.4D through 4.4F, for the UMFZ, LMFZ, and the LFZs respectively and is discussed below.

Upper-Mid Flow Zone (Goat Island Dolostone)

Groundwater flow in the UMFZ retains a low flow gradient from east to west beneath the Operating and Closed Facilities. Figure 4.4D depicts the flow conditions during June 2021 and it indicates that the pumping of M4 is drawing in impacted groundwater from this zone. Shatter Trench containment well M5R is intended to extract groundwater from the UMFZ. The operation of M5R is further discussed in the Closed Facility AMR.

The CPTSS dewatering resulted in a water level declines within the UMFZ. Similar to the UFZ, since the completion of the CPTSS dewatering activities, water levels have followed recovering trends but have not yet fully recovered. Monitoring location 49-II increased by over 5 m since the completion of dewatering activities, with water levels similar to those recorded in 2012. Locations near the southwest corner of the Closed Facility show less recovery after the CPTSS dewatering activities.

Lower-Mid Flow Zone (Goat Island Dolostone)

Figure 4.4E illustrates the groundwater flow in the LMFZ in June 2021. As in past years, the LMFZ groundwater near the Site is interpreted to flow from east to west towards containment well L1. There also appears to be a localized high around monitoring location 44-II.

Following the CPTSS dewatering, water levels in the LMFZ have increased slightly although are still low compared to typical water levels prior to the CPTSS dewatering. Some additional declines in water levels in the LMFZ have also been observed following the rehabilitation of L1.

Additionally, the historically strong downward gradients appear to have increased between the UMFZ and LMFZ. Monitors within the LMFZ are recovering slower from the CPTSS dewatering activities than the UMFZ. Continued monitoring is required to assess whether the increased downward gradient is a permanent change or a transient condition resulting from the CPTSS dewatering activities.

Lower Flow Zone (Goat Island Dolostone/Ancaster Chert)

Groundwater flow in the LFZ is along a bedding plane within the Ancaster Chert beds. Previous observation of cores indicates that the LFZ is more permeable towards the Niagara Escarpment and much less permeable within the Site (GLL, 1996b). Previous reports have identified monitoring locations 34, 35, 43, 44, 45, 46, 48, 59, P5, P10, and P11

as having an open fracture and being permeable in comparison to locations 36, 49, 51, 69, and P7 where the fracture is closed or in filled and flow is limited.

Figure 4.4F depicts the interpreted groundwater flow conditions in June 2021. The previously noted gradient from east to west is no longer as evident. Water levels show a gradient towards containment well L1, located to the west of the Closed Facility. Containment well L1 recently underwent rehabilitation and continues to operate at a constant pumping level. Future observations will assist in demonstrating the effectiveness of this containment well.

The water levels in the LFZ continue to follow slow recovery trends following the CPTSS dewatering. Locations closer to L1 and across the LFZ have had smaller recovery, likely due to the rehabilitation and constant operation of L1. Generally, the lower flow zones are exhibiting slower recovery from the CPTSS dewatering than shallower flow zones, although note that the LFZ showed less impact to water levels while the CPTSS dewatering was occurring.

Future annual reports should evaluate whether any permanent lowering of water levels within the LFZ has occurred.

Rochester Shale

Previous studies have indicated that the horizontal hydraulic conductivities in the Rochester shale are less than 10^{-8} centimetre per second (cm/s) as measured in monitors 51-VI and 59-I. Vertical hydraulic conductivities have been estimated to be in the range of 10^{-8} to 10^{-10} cm/s. This suggests strongly that the horizontal groundwater flows in this unit are very slow. This unit acts as a significant aquitard and is considered the base of active groundwater flow in this area. Groundwater moving vertically from the flow zones above the Rochester Shale will be deflected horizontally towards the Niagara Escarpment once they reach this unit. Close to the Niagara Escarpment, the Rochester Shale is more porous and will allow a greater degree of vertical groundwater flow. There are insufficient monitors within the Rochester Shale at the site to allow potentiometric contouring of this flow zone.

4.4.6 Influence of the CPTSS Project and Subdivision Development

Water levels along the eastern boundary of the Operating Facility have been particularly influenced by dewatering activities.

At monitor nest 48, depicted on Figure 4.5 (below), water levels in all flow zones reacted to the Phase One CPTSS dewatering. A notable lowering of the water levels in all of the monitors occurred between mid-2011 and August 2012 after which water levels rose until March 2013. Since then, monitors 48-III (UFZ), 48-IV (Water Table), and 48-V (VFZ) returned to near historical levels. When the Phase Two CPTSS dewatering began in late 2015, water levels declined to the end of 2016. Water levels in 2017 and 2018 showed recovery at the Water Table, VFZ, and UFZ monitoring locations (48-III, 48-IV, and 48-V). Deeper flow zones (UMFZ and LFZ) show less recovery since the completion of CPTSS dewatering in late 2016. The speed of recovery at locations is dependent on hydrogeologic conditions and influence from other anthropogenic activities (i.e., remediation systems). Projecting recovery observed following 2018, in 48-I and 48-II shows that water levels will not recover fully from CPTSS dewatering until at least 2050 and 2030 respectively. Ongoing monitoring results will confirm the current recovery trends.

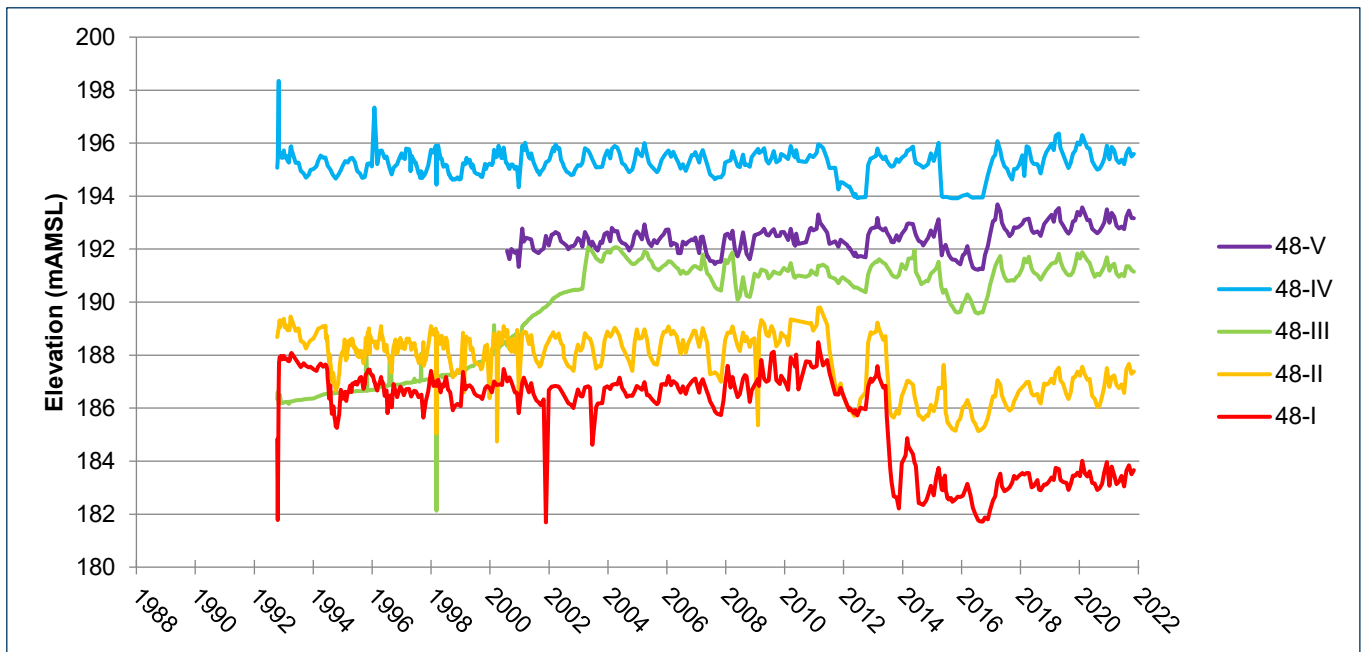


Figure 4.5 Monitoring Well Nest 48 - Hydrographs

4.4.7 Influence of Closed Facility on the Operating Facility

The historical impacts from the Closed Facility relate to the north-easterly movement of impacted groundwater, primarily through the VFZ, a continuous layer of dolostone within the Vinemount Shale rock formation, which forms the floor of both the Closed and Operating Facilities. Pumping of the former South Sump had, over the years, resulted in a draw of impacted groundwater through the horizontally permeable VFZ from the Closed Facility towards the former South Sump (located near the southwest corner of the Operating Facility). As a result of this migration, all water pumped from the South Sump had historically been directed to the sanitary sewer. The Groundwater Pumping Station was completed and commissioned during late 2007 and has replaced the South Sump. All groundwater pumped via the Groundwater Pumping Station ultimately discharges to the sanitary sewer.

As previously described, a Perimeter Drain, Grout Curtain, and groundwater collection trench system has been completed along the western wall of the Operating Facility to intercept the majority of this impacted groundwater in the future (Figure 4.1). The Perimeter Drain was commissioned in 2007 but was not operated on a continuous basis sufficient to create the intended control of impacted groundwater from the Closed Site. As previously noted, operational issues have plagued the successful operation of this system and until a solution is found, reliance is being placed upon the collection of impacted groundwater by the operation of M4, the Shatter Trench, and the Containment Wells.

GFL intends to undertake an assessment of the viability of servicing the Perimeter Drain system. Proposed servicing will likely include cleaning of the drain and pumping equipment so that regular groundwater pumping at this location can resume.

4.4.8 Permit to Take Water

As previously discussed, there are remedial pumping systems in place to address the impacts of the Closed Facility on the groundwater systems in the vicinity of both Facilities. These systems are permitted under the PTTW No. 6543-9ZGNU5 (see Appendix A) described in the introduction of this report. The required PTTW records are included in this report in Appendix M. The systems were monitored according to the permit conditions during the current reporting period. The details of the monitoring and an interpretation of the results are included in the Closed Facility Annual Monitoring Report since the systems are specifically for the control of the Closed Facility impacts.

4.4.9 Groundwater Quality

Groundwater quality data was compiled and is presented in Appendix N. As previously noted, the Operating and Closed Facility monitoring programs overlap and as such Appendix N is inclusive of all groundwater quality data from 2021.

The contingency plans for the Operating Facility set out a trigger concentration evaluation procedure to provide early warning of a potential groundwater impact should the engineered liner of the Operating Facility fail at some point in the future. The trigger criteria were originally established based upon the Reasonable Use Policy in the context of background concentrations of groundwater, as they were known at the time of approval (1996) (MECP Guideline B-7 and B-7-1 *Incorporation of the Reasonable Use Concept into the MOEE Groundwater Management Activities and Determination of Contaminant Limits and Attenuation Zones* (MOEE, 1994)).

The addition of background monitoring well nest 77 provides a representation of current water quality flowing onto the Site. Guideline B-7 and B-7-1, recommend that trigger concentrations be updated once every 3 to 5 years to account for natural fluctuations in background water quality. Ideally, 5-year median concentrations would also be used to facilitate calculating trigger concentrations. Only 2 years of background data is available; however, sampling shows reasonably stable water quality. Thus, for this report the RUC trigger concentrations have been recalculated using the background water quality from well nest 77. Water quality from the shallow well, 77-III, has been used to calculate RUC trigger concentrations for the shallow groundwater flow (Eramosa, VFZ, and UFZ). Water quality from 77-II has been used to calculate RUC trigger concentrations for the UMFZ and LMFZ. Water quality from 77-I has been used to calculate updated RUC trigger concentrations for the LFZ.

It should be noted that the assessment of trigger concentrations needs to be tempered by the understanding that the background groundwater is generally poor, particularly in the deep flow zones. Concentrations are in some cases higher than the leachate parameters, and that the background groundwater quality naturally varies with the seasons and that in some areas, groundwater at the Operating Facility has been impacted by the leachate from the Closed Facility.

Another overarching consideration in the review of the trigger concentrations is that the engineered liner system must have failed (leaked leachate contaminants) to actually impact the groundwater.

The Operating Facility liner system has been monitored to the extent that clearly demonstrates that no water was collecting in the HCL other than that which is trapped during the construction process. For the Operating Facility leachate impacts to reach the groundwater it would have to pass through the HCL and the lower secondary clay layer. Thus, the HCL's water quality (if water is present) provides a very conservative, additional early warning of potential contaminant release (contaminants in the HCL would need to migrate through the secondary liner before reaching the natural environment).

The trigger assessment will have more relevance to the potential for detecting contaminant migration from the Operating Facility once the liner system is complete, and the HCL is charged with municipal water. Even then it is only when impacts are detected within the water contained in the HCL that the potential for contaminant migration through the secondary clay layer will increase. In the meantime, monitoring of the groundwater in, and around the Operating Facility should continue to be primarily focused upon monitoring the effectiveness of the remedial measures being undertaken in the context of the associated evolution of the natural background groundwater quality in an area undergoing urban development.

The updated Reasonable Use Concentration (RUC) trigger levels have been compared to the 2021 groundwater sampling results for the parameters included in the original trigger table established in 1997. The comparison of groundwater data to trigger concentrations for each Flow Zone is discussed in the following sections.

It is recommended that RUC trigger levels be updated on an annual basis until a 5-year median can be calculated. Trigger levels should then be updated on a 3-to-5-year basis.

Only a few parameters that have RUC trigger levels are leachate indicator parameters. Leachate indicators including total ammonia, phenols, conductivity, calcium, magnesium, potassium, strontium, and bromide do not have health or

aesthetic based ODWS (MOE, 2003 amended 2006, 2017). Chloride, pH, and sodium have aesthetic objectives (AO) or operating guidelines (OG) only.

Analytical results for the majority of samples collected from the lower flow zones at the Site indicate chloride, sodium, and sulfate at levels frequently elevated above the ODWS AO. Hardness, iron, and manganese are frequently above the AO ODWS as well. These parameters are naturally occurring at elevated concentrations in most of the groundwater near the Site. In fact, it is common for these parameters to be detected at concentrations greater than leachate in the naturally occurring saline groundwater found in the deeper flow zones. The use of a RUC trigger levels to determine the need for further action is complicated by the aforementioned constraints.

Monitoring results are also assessed as to the degree of leachate impact based upon:

1. A review of the chemistry from a monitor, including the indicator parameters (phenols, chloride, total Ammonia, pH, conductivity, calcium, potassium, and fluoride). Includes a review of temporal trends in these parameters (i.e., changing concentrations over time).
2. A consideration of the ratio of ammonia to strontium and whether that ratio value is above 0.5.
3. A consideration of the ratio of chloride to magnesium and whether that ratio is above 25. The ratio of ammonia to strontium and ratio of chloride to magnesium are generally referred to as the impact ratios.
4. A review of the comparison of water quality data to the calculated Reasonable Use trigger number at selected monitoring wells.
5. A consideration of the water level monitoring and status of the containment system operations.

4.4.9.1 Shallow Water Table Flow Zone

Trigger levels have been calculated for monitors 47-IV, 48-IV, 49-IV, 50-II, and 51-V. Table 4.7.1A presents the RUC trigger level assessment results. Table 4.7.2A presents the water quality assessment (i.e., impact ratios and phenols concentrations).

Several parameters sporadically exceeded their respective 2021 updated RUC trigger criteria throughout the Shallow Water Table flow zone including lead, manganese, sodium, nitrate, and sulfate. This is generally consistent with recent past data. It is noted that fluoride concentrations are frequently just above its respective trigger criteria and that chloride concentrations are often well above the trigger level.

The fluctuating and minor increases above background concentrations are interpreted to be due to natural variations as the impact ratios (NH₃/Sr and Cl/Mg) and phenols concentrations have not indicated landfill-related impacts in this flow zone.

The distribution of impacts, or lack there-of, across the Shallow Water Table flow zone are illustrated on Figure 4.6A.

4.4.9.2 Vinemount Flow Zone

Trigger levels have been calculated for monitors 47-III, 48-V, 60-III, and 61-III. Table 4.7.1B presents the RUC assessment results. Table 4.7.2B presents the water quality assessment (i.e., impact ratios and phenols concentrations). RUC trigger exceedances for sodium and chloride were common in the VFZ monitoring wells. Exceedances are discussed in more detail below:

- RUC trigger exceedances for boron, sodium, chloride, and sulphate were common in the VFZ monitoring wells.
 - Sulphate exceedances appear common across the VFZ trigger wells and may reflect natural variability rather than landfill impacts.
- RUC trigger exceedances are particularly frequent at monitoring wells 48-V and 61-III. Both wells are located in the northeast corner of the Operating Facility portion of the Site. Impact ratios and phenols at both locations show that landfill derived impacts are not present (i.e., ratios are below their respective thresholds and phenols are

below laboratory reporting limits). Thus, RUC trigger exceedances are likely related to natural water quality variation.

- It was suspected that water quality at 48-V may have been impacted by the CPTSS project. In specific, concentrations of chloride show a decrease and increase that correlates with CPTSS dewatering (see Appendix F). Concentration trends show that water levels in 48-V have recovered from the CPTSS dewatering and water quality reflects pre-CPTSS conditions.
 - At monitor 61-III, infrequent exceedances of chloride, sodium, iron, and manganese began in late 2014. Updated RUC triggers based on 2021 background water quality shows exceedances of boron, sodium, chloride, and sulphate. Impact ratios and phenolic concentrations are low which provide evidence that these exceedances are not landfill related. Thus, exceedances are likely due to natural variation.
- Historically, monitor 47-III has had occasional RUC exceedances for sodium and chloride. The nested shallow monitor (47-IV) has suspected road salt impacts, with elevated sodium and chloride levels. Vertical leakage from the water table may contribute to the elevated sodium and chloride concentrations. In 2021, boron and sulfate exceeded the trigger concentrations. Concentrations in 2020 and 2021 are below the updated 2020 and 2021 RUC trigger concentrations providing further evidence that the VFZ at this location is not impacted by the landfill.
- In 2021, water quality at 60-III exceeded the RUC triggers for boron, sodium, chloride, and sulphate in January. Sulphate at this location exceeded its respective trigger throughout 2021. Elevated concentrations during the January monitoring event are consistent with past results and indicate a seasonal trend. All other concentrations met their respective RUC triggers. Water quality at this location has improved from previous years. Well nest 60 is located on the northern most boundary of the Operating Facility. The RUC trigger assessment and low impact ratios and phenolic concentrations continue to provide evidence that this location has not been impacted by leachate.

Figure 4.6B illustrates the distribution of landfill-related impacts across the VFZ monitoring well network with the interpreted June 2021 groundwater flow contours. Monitoring wells are categorized to coarsely illustrate the interpreted distribution of the impacts across the Site within the VFZ.

As illustrated on Figure 4.6B, an area of impacted groundwater within the VFZ is present at the Site. It can be described as extending beneath and along the southern boundary of the Closed Facility. Minor impacts persist in the vicinity of the Lower Excavation and the Groundwater Pumping Station in the Operating Facility site.

The distribution of the impacted groundwater in this flow zone is related to several factors including: the effects of historic leachate recirculation in the Closed Facility and then historic pumping of the Groundwater Pumping Station, the presence of the Lower Excavation, and the associated M4 pumping. Groundwater flow in the VFZ is generally directed towards the Operating Facility providing a mechanism for impacts to reach the Operating Facility. After leachate recirculation ended, chemistry trends had generally been decreasing in the VFZ.

4.4.9.3 Upper Flow Zone

Trigger levels have been calculated for UFZ monitors 47-IIR, 56-II, and 61-II. Table 4.7.1C presents the RUC assessment results. Table 4.7.2C presents the water quality assessment (i.e., impact ratios and phenols concentrations).

The 2021 analytical data shows exceedances for manganese at 47-IIR. Past results have shown occasional manganese, sodium, and chloride exceedances. Impact ratios were low at 47-IIR and phenolic are below laboratory reporting limits. This well is not interpreted to be impacted by either landfill.

There were no exceedances of the trigger levels at 56-II during 2021 (which is consistent with past results). Low impact ratios and phenolic concentrations provide more evidence that this location is not impacted by either facility.

At monitor 61-II, several parameters exceeded the updated 2021 RUC triggers including: boron, manganese, sodium, fluoride, and sulphate. In 2020, phenols and impact ratios at this location did not indicate landfill related impacts. In 2021, the ammonia/strontium ratios show the potential for impacts and a low-level phenol detection was made. Water

quality at this location resembles its nested VFZ well. Trigger exceedances at this location are interpreted to be due to lingering impacts from the Closed Facility and natural variation and are not related to either Operating Facility.

Figure 4.6C illustrates the distribution of landfill-related impacts across the UFZ monitoring well network with the interpreted June 2021 groundwater flow contours. Monitoring wells are categorized to coarsely illustrate the interpreted distribution of the impacts across the Site within the UFZ.

The area of impacted groundwater within this flow zone has been influenced in the past by leachate recirculation in the Closed Facility (1992-1993), which resulted in a substantial spreading of the impacted area. As a result, an area of impacted groundwater extended from beneath the Closed Facility to the Eramosa Scarp, and partially under the Operating Facility. Since the implementation of the Scarp Containment Wells and subsequently the Shatter Trench and pumping well M4, the spread of the impacted area has been limited and there have been improvements in groundwater quality in the majority of the monitors in this zone.

As illustrated in Figure 4.6C, current monitoring results show landfill-related impacts continue to be present across the Site but are not interpreted to have migrated beyond the Eramosa Scarp. Only minimal impacts are present in the Operating Facility in the vicinity of the Lower Excavation. This may be due to downward flow from the VFZ. Impacts are not interpreted to be related to the Operating Facility.

4.4.9.4 Upper-Mid Flow Zone

Trigger levels have been calculated for UMFZ monitors 46-IIR, 48-II, 49-II, and 56-I. Table 4.7.1D presents the RUC assessment results. Table 4.7.2D presents the water quality assessment (i.e., impact ratios and phenols concentrations).

The 2021 analytical results show exceedances of fluoride and sulphate are common in the UMFZ wells.

During the current reporting period, exceedance of the RUC triggers for fluoride and sulphate are noted consistently at 48-II and 36-IR. However, the impact ratios and phenols concentrations have consistently indicated that landfill related impacts are not present at 48-II. Monitoring well nest 48 is located on the northeast side of the Operating Facility and is interpreted to be in an upgradient position within the UMFZ, as the gradient is towards the Lower Excavation. The exceedances are not considered to be related to landfill impacts. Impact ratios at 36-IR show relatively minor impacts with ammonia/strontium ratios just over their respective trigger (1.07 to 1.23 versus 0.5).

Figure 4.6D illustrates the distribution of landfill-related impacts across the UMFZ monitoring well network with the interpreted June 2021 groundwater flow contours. Monitoring wells are categorized to coarsely illustrate the interpreted distribution of the impacts across the Site within the UMFZ.

The area of impacted groundwater within the UMFZ is extensive across the Closed Facility and is interpreted to encompass an area extending from Mud Street in the south, along the Eramosa Scarp in the vicinity of the Shatter Trench and across the northwest corner of the Operating Facility. The impacts observed on the Operating Facility property are related to historic operation at the Closed Facility.

Improving water quality in the UMFZ is most apparent along the Eramosa Scarp in the vicinity of L1/CW3. This provides evidence for the success of the Site remediation systems. Previous interpretations of shown landfill impacts extending further across the Eramosa Scarp.

4.4.9.5 Lower-Mid Flow Zone

Trigger levels for this flow zone were set for monitoring well 34-III; however, monitoring well nest 34 was decommissioned for subdivision construction. Monitor 29-IV is the only monitor in this flow zone beneath the Operating Facility where the LMFZ has been identified. Since it does not have a significant aerial extent and there are flow zones above and below this flow zone which are extensive and are monitored regularly, it is recommended that trigger monitors should not be established for this flow zone.

For reference, Figure 4.6E illustrates the distribution of impacts in the LMFZ. As discussed above, LMFZ wells and impacts are largely found on the Closed Facility. Landfill derived impacts have been identified at 29-IV by elevation

ammonia/strontium ratios; however, impacts at this location are related to the recirculation of leachate at the Closed Facility. Impacts in this area of the Operating Facility are interpreted to have been drawn from the Closed Facility towards the Lower Excavation by the operation of M4.

4.4.9.6 Lower Flow Zone

The current monitoring program include RUC triggers for LFZ monitors 48-I, and 60-IV. Table 4.7.1E presents the RUC assessment results. Table 4.7.2E presents the water quality assessment (i.e., impact ratios and phenols concentrations).

At monitor 48-I, the trigger for sulfate is consistently reported in excess of the RUC Trigger level while exceedances of fluorite are common. However, impact ratios have shown no indication impacts at 48-I since 2017. Impact ratios at 60-IV indicate possible minor landfill derived impacts. The RUC trigger exceedances at 60-IV, fluoride and sulphate, are likely due to a combination of minor landfill derived impacts from the Closed Facility and natural variation in water quality.

Figure 4.6F illustrates the distribution of landfill-related impacts across the LFZ monitoring well network with the interpreted June 2021 groundwater flow contours. Monitoring wells are categorized to coarsely illustrate the interpreted distribution of the impacts across the Site within the LFZ.

Similar to the UMFZ and LMFZ, the LFZ is impacted over an area that generally follows the line of the Eramosa Escarpment along the northern boundary of the Closed Facility and extending to the east to the Lower Excavation. Some minor impacts are interpreted beyond the Lower Excavation.

Previous reports have noted that the development of the Shatter Trench created a temporary spread of impacted groundwater into the LMFZ and that the creation of the Lower Excavation historically allowed the leakage of impacted groundwater into the LMFZ and the LFZ. Pumping of the M4 and M5R wells redirects groundwater flow to the pumping centers at the Lower Excavation and Shatter Trench, respectively. The pumping at these wells reduces the vertical downward gradients and slows the movement of contaminants into the LFZ.

4.4.9.7 Rochester Shale

The current monitoring program includes only a single monitor, 76-I, within the Rochester Shale unit. Reasonable Use trigger levels have not been developed for this unit. Water quality results do not indicate the presence of landfill related impacts.

4.5 Escarpment Springs

The location of the groundwater seeps on the face of the Niagara Escarpment is shown on the Site Plan, Figure 2.1. In 2021, none of the seeps were sampled due to unsafe access conditions. This issue was addressed in a submission to the MECP in April 2016. Groundwater originating from these seeps is influenced by the very poor-quality groundwater found in the Rochester Shale. The primary leachate indicators for the most recent data available do not show any indication of impact from either Facility.

4.6 Surface Water

4.6.1 Background

Surface water runoff from the Operating Facility is managed using the perimeter berm, the LCS, and/or the Stage 1 Stormwater Management Pond 1 (SWMP1), as further described below:

1. The perimeter berm surrounds the Operating Facility and directs precipitation to the roadside ditches around the Site. Runoff from the berms is not impacted by Site operations. The roadside ditches lead to stormwater drains and do not intersect any surface water features.

2. Other precipitation that falls within the Operating Facility property but outside of the active landfilling area, is captured by the GCS and directed to sumps cut into the floor of the former quarry. From there, the collected water is pumped through a forcemain to a retention pond (T-3A) and is then pumped through a forcemain to an equalization pond (T-1S) on the Closed Facility property where it connects to the City's municipal sanitary sewer system.
3. Runoff from the capped portion of the Operating Facility is directed to the Stage I SWMP, completed in 2013. The Stormwater Contingency and Remedial Action Plan⁴ was prepared to guide the operation of the ponds (see Appendix B). Depending on the surface water quality compared to discharge criteria, the discharge from the SWMP is directed to either the retention pond (T-3A) or to a catch basin located at the southeast side of the intersection of First Road West and Green Mountain Road West. The catch basin connects to a storm sewer which runs to the north under First Road West. To date, stormwater has been discharged to the T3-A retention pond and not to the storm sewer because the phosphorous requirement has not been met.

4.6.2 Monitoring Program

The current surface water monitoring program (detailed in Table 4.8, below) at the Operating Facility consists of eight locations focusing on the surface water quality downstream of the Site. The program overlaps with the Closed Facility surface water monitoring program, and therefore the combined surface water station locations are shown on Figure 4.7. Table 4.9 provides more detailed descriptions of historical and current surface water monitoring at both Facilities.

In accordance with the ECA and the Closed Facility monitoring program, it is intended there are at least eight surface water monitoring events per year. Surface water samples are to be collected multiple times in spring, summer, and fall following periods of increased (wet) and decreased (dry) precipitation. All samples, including during dry events, should be collected when there is visible flow. In 2021, there were 16 surface water locations sampled within eight monitoring events (includes the Closed and Operating Facility programs). There were no samples collected during the April dry or October dry events due to wet conditions. Table 4.8, below, summarizes the surface water monitoring program completed in 2021.

Table 4.8 2021 Surface Water Monitoring Program

Monitoring Location	Dry	Spring Freshet	Dry	Spring Rain	Summer Rain	Dry	Dry	Dry	Fall Rain	Dry
	Jan	Mar	Apr	Apr	Jul	Aug	Sept	Oct	Oct	Nov
On-Site										
T-1R*	✓	✓❖		✓	✓	✓❖	✓		✓	✓
T-3R		✓❖					✓		✓	✓
T-3A* (formerly T-3)	✓	✓❖		✓	✓	✓❖	✓		✓	✓
North Sump		✓❖				✓❖				
SWMP1		✓❖		✓	✓	✓❖			✓	
Downstream – East of Site										
T-15R	✓	✓❖		✓	✓	✓❖	✓		✓	✓
T-23*		✓				✓				
Downstream – West of Site										
T-13		✓		✓	✓	✓			✓	
T-28*		✓				✓				

⁴ Stormwater Contingency and Remedial Action Plan - Stage I Stormwater Management Facility, Newalta Stoney Creek Landfill.

Table 4.8 2021 Surface Water Monitoring Program

Monitoring Location	Dry	Spring Freshet	Dry	Spring Rain	Summer Rain	Dry	Dry	Dry	Fall Rain	Dry
	Jan	Mar	Apr	Apr	Jul	Aug	Sept	Oct	Oct	Nov
Downstream – East and West Combined										
T-16		✓		✓	✓	✓			✓	
T-21*		✓				✓				
Upstream – West of Site										
T-12*		✓❖		✓	✓	✓❖			✓	
T-29		✓		✓	✓	✓			✓	
T-30		✓		✓	✓	✓			✓	
T-31		✓		✓	✓	✓			✓	
T-32		✓		✓	✓	✓			✓	
Notes: ✓ - Sampled for general chemistry and metals ❖ - Sampled for volatiles, semi-volatiles, and pesticides * - Sampling required as per the ECA NM – Not Monitored as required as per ECA										

4.6.3 Monitoring Program Deviations

The majority of the surface water program was executed in accordance with the ECA requirements.

No sample was collected from location T-3R in January, May, July, or August 2021, as there was no discharge from the pond.

The April-dry and October-dry sampling events were not completed in 2021 due to wet conditions.

4.6.4 Surface Water Monitoring Program Rationalization

In 2019, GFL applied for and was granted an amended ECA to expand the Operating Facility. As part of the amended ECA, a complete surface water monitoring program rationalization was undertaken in order to focus surface water monitoring on current Site operations and potential for impacts. Major changes to the monitoring program were proposed including reducing the frequency of water quality monitoring to semi-annual and reducing the analytical parameter lists at select locations.

To be consistent between the two facilities, the monitoring program for the Closed Facility should be adjusted to match the rationalized monitoring program that has been approved for the Operating Facility.

Due to the overlap in monitoring programs, changes to the current monitoring program, at both Facilities, have been delayed pending MECP approval to use a consistent monitoring program. Discussions between GFL and the MECP regarding a consistent monitoring program are ongoing.

4.6.5 Surface Water Monitoring Results Discussion

The surface water quality monitoring data for 2021 is presented in Appendix O, which, due to the overlap in monitoring programs, also includes the Closed Facility surface water monitoring program data.

4.6.6 Inorganic Surface Water Quality

Error! Reference source not found. below shows a summary of the locations with exceedances of the PWQO.

Table 4.10 Parameters Exceeding the PWQO

Parameter	Aluminum (total)	Arsenic	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Molybdenum	Zinc	Phosphorus	pH	Phenols
On-Site														
North Sump	x		x					x	x			x		
T-3A (Retention Pond)	x		x			x		x	x		x	x	x	
T-3R	x		x	x	x	x	x	x	x		x	x	x	x
T-1R (Clay Lined Pond)	x	x	x	x		x		x		x	x	x	x	x
SWMP1 (TS-1)	x							x		x		x	x	
Downstream – East of Site														
T-15R	x			x				x			x	x		
T-23	NA	NA		NA		NA	NA	NA	NA	NA	NA	NA		
Downstream – West of Site														
T-13	x						x	x			x	x		
T-28	NA	NA		NA		NA	NA	NA	NA	NA	NA	NA		
Downstream – Combined East and West of Site														
T-16	x							x			x	x		
T-21	NA	NA		NA		NA	NA	NA	NA	NA	NA	NA		
Upstream – West of Site														
T-12	x							x			x	x		
T-29	x							x			x	x	x	
T-30	x							x			x	x	x	
T-31	x							x			x	x	x	
T-32	x						x	x			x	x		
Note: NA - Not analyzed; partial samples only														

In 2021, PWQO exceedances for aluminum, iron, zinc, and phosphorus were common upstream, downstream, and on-Site, as shown above. Comparable concentrations were detected upstream and on-Site for aluminum and phosphorus. Higher concentrations of zinc and iron were detected upstream compared to on-Site. Due to the widespread detections of these parameters above the PWQO, these detections are interpreted to not be landfill related.

The following comments are provided with regard to surface water quality at both Facilities.

Upstream Surface Water Quality

- Multiple upstream stations had surface water that exceeded the PWQO for aluminum, iron, zinc, and phosphorus. During the reporting period, there were also exceedances for copper and pH at select locations. As these stations are located upstream, these detections are not related to either Facility. These stations were intended to monitor changes in water quality from urban impacts. Accordingly, detections above the PWQO for these parameters at downstream stations may not be attributable to the Closed Facility.

On-Site Surface Water Quality

- Surface water stations on-Site showed detections above the PWQO for various metals, phosphorus, phenolics and pH. These stations collect impacted groundwater from leachate collection, containment wells, and waste processing. These stations discharge to the sanitary sewer.
- On-Site monitor, T-1R is located in a clay-lined retention pond that discharges to the sanitary sewer. Phenols and phosphorus were reported above the PWQO in all 12 samples from T-1R. Additionally, boron exceeded the PWQO in most samples from T-1R. Phenols were not detected downstream. Boron and phosphorus are commonly detected above the PWQO in surface water samples upstream, downstream, and on-Site.
- Elevated sodium and chloride concentrations were detected at the North Sump, T-3A, and T-1R. Comparable concentrations were detected upstream, with the exception of concentrations measured at T-1R.
- Lower concentrations of sodium, chloride, and metals were generally detected at the stormwater pond TS-1 compared to other on-Site locations.

Downstream Surface Water Quality

- Multiple downstream stations had detections of aluminum, iron, zinc, and phosphorus above the PWQO, consistent with detections and concentrations upstream.
- In addition to the common upstream exceedances, downstream station T-15R also exceeded the PWQO for cadmium and T-13 had a PWQO exceedance for copper. Copper also exceeded the PWQO at upstream location T-32. There have been historical PWQO exceedances upstream for cadmium.

Since the cessation of direct surface discharge to the off-site drainage channel at the western boundary of the Site, there has been no indication that leachate indicator parameters are affecting the water quality of Davis Creek through the groundwater pathway. Surface water runoff from the Operating Facility is controlled through the perimeter berm, the GCS, and LCS discharging to the sanitary sewer.

4.6.7 Organic Surface Water Quality

Sampling for trace organic compounds is completed in accordance with MISA requirements. Organic parameter monitoring was conducted in 2021 during the Spring Freshet (March) and August-Dry monitoring events at T-12, T-15R, North Sump, SWMP1, T-3A, T-3R, and T-1R monitoring locations.

The T-1R, T-3R, and T-3A stations are internal equalization ponds, which receive impacted groundwater from the Shatter Trench, M4 pumping, and waste processing. No organic compounds were detected at station T-3A. Five organic compounds were detected at T-3R (chloroform, ethylbenzene, and xylene isomers) and six organic compounds were detected at station T-1R (acetone, benzene, 2,4-Dimethylphenol, 2-Methylnaphthalene, 2-Methylphenol, Naphthalene). 2-Methylphenol was detected at a concentration above the applicable PWQO at location T1-R.

No organic compounds were detected in the surface water samples collected from T-15R, T-12, North Sump, or SWMP1 in 2021.

4.7 Surface Water Trigger Program

As required by the SWMP's ECA No. 5400-7DSSHU, a contingency plan was developed and submitted to the MECP in 1997. Initial action levels (IALs), acute toxicity levels (ATLs) and contingency action plans were developed. The IALs were initially compared to data for station T-3 and T-4.

As described in Table 4.9, station T-4 was eliminated with the construction of the Heritage Green Sports Park. The grading was changed in this area for the Heritage Green Sports Park and surface water no longer flows in this area. Station T-3 no longer exists due to road reconstruction and the installation of new stormwater infrastructure. The discharge point from the SWMP has been relocated to the storm sewer under First Road West. Surface water station T-3 was replaced by T-3A and is located at the northwest corner of the retention pond.

The approval requirements for the SWMP1 and the Stormwater Contingency and Remedial Action Plan have been reviewed. Table 4.11 shows the trigger assessment for the SWMP1.

Table 4.11 SWMP1 Trigger Assessment

Station Name	Sample Date	Field Conductivity (umhos/cm)	Lab pH (std. units)	Phenols (mg/L)	Unionized Ammonia (mg/L)	Phosphorus (mg/L)
SWMP Trigger Concentration		700	6.5-8.5	0.002	0.04	0.03
SWMP	March 22, 2021	485	8.17	ND (0.0010)	ND (0.001)	<u>0.085</u>
	April 30, 2021	525	<u>8.72</u>	ND (0.0010)	ND (0.014)	0.018
	July 2, 2021	408	<u>8.92</u>	ND (0.0010)	ND (0.04)	<u>0.059</u>
	August 5, 2021	406	<u>8.97</u>	ND (0.0010)	<u>ND (0.048)</u>	<u>0.077</u>
	October 5, 2021	<u>923</u>	7.73	ND (0.0010)	0.003	<u>0.58</u>
Notes:						
<u>Underline</u> – Analytical result exceeds its respective trigger concentration						
ND – Non-detect; NS – Not sampled; 0.1/0.1 – Sample/Duplicate						

SWMP water has not been discharged off-Site due to the water quality not meeting the trigger concentrations. To date, all the water collected in the SWMP has been directed to the sanitary sewer connection through the Closed Facility.

4.8 Air Quality

As specified by the ECA, air quality monitoring was conducted following consultation with the MECP and using sample methods approved by the MECP. The following sections discuss the air quality monitoring completed by Rotek.

4.8.1 Particulate Matter (PM₁₀)

Similar to past years, in 2021, air quality monitoring was conducted using a Met One BAM 1020 (Beta Attenuation Monitor). These devices continuously monitor and record air quality for PM₁₀ sized particles. For the majority of 2021, the BAM was located at the east property line downwind of the Facility (STN ID 29147). During September 2021, the monitoring station was moved to the Operating Facility's north property line along Green Mountain Road (STN ID 29247). The move was made to better capture facility emissions due to the evolving landfill configuration and to assess the impact on the new off-Site residential development. The data compilation and interpretation of the 2021 air quality program is detailed in the Rotek Environmental Ambient PM₁₀ Monitoring Program report for 2021, included in Appendix P.

The monthly reports of the PM₁₀ measurements and corresponding hourly data are included in the monitoring report prepared by Rotek Environmental Inc. (Rotek). During 2021, there was several episodes of elevated PM₁₀. These

included four exceedances of the daily PM₁₀ guideline (50 microgram per cubic metre [$\mu\text{g}/\text{m}^3$]) and 27 exceedances of the hourly PM₁₀ guideline (100 $\mu\text{g}/\text{m}^3$).

The annual mean trend lines continue to remain stable and are slightly better than the City of Hamilton's three PM₁₀ monitoring sites (located on Land Street, Strathearne Avenue, and Beach Boulevard).

Rotek's report concluded that the primary PM₁₀ sources contributing to the 90th and 98th percentiles appear to be from the Upper Centennial Parkway/Mud Street road traffic with contributions from facility activity.

No dust complaints were received at the Facility.

4.8.2 Atmospheric Conditions

Meteorological parameters including wind speed, wind gust, wind direction, ambient temperature, relative humidity, and rainfall were monitored and logged for the year by Rotek in conjunction with the air quality monitoring. The results of this monitoring are contained in the Ambient PM₁₀ Monitoring Report, in Appendix P.

4.9 Noise

In compliance with Condition 44 of the ECA, noise monitoring was conducted twice during the current reporting period (July and December) by Rotek and confirmed that the noise levels generated at the site are below measured background noise for the surrounding area and are considered to be compliant with the MECP guideline. The noise monitoring reports can be found in Appendix Q.

5. Future Monitoring

A full monitoring program rationalization for the Operating Facility was submitted and accepted by the MECP as part of the updated Operating Facility ECA. It is recommended that the monitoring program at the Closed Facility be amended to match the approved monitoring program for the Operating Facility.

GFL intends to continue the monitoring programs as is until the rationalized program is approved for use at both facilities.

Accordingly, the recommended monitoring program is outlined in Tables 2.1 and 7.2. As in previous presentations of these tables, the combined Closed and Operating Facility monitoring programs are presented as there are significant overlaps.

Previous annual monitoring reports have recommended suspending sampling at a number of monitoring wells due to low water levels and poor recovery following the CPTSS dewatering. This includes monitoring wells 29-III, 48-III, 49-IR, 49-III, and 50-I.

Prior to the CPTSS dewatering, monitoring wells 29-III, 48-III, 49-IR, 49-III, and 50-I were characterized by very poor recovery. In order to limit ambiguous water quality results due to poor recovery, it is recommended that these wells continue to be used for water levels only.

6. Conclusions and Recommendations

Based upon the above discussion the following conclusions and recommendations are provided:

- 1. Based upon the information provided in this report and outlined in Table 2.1C, the conditions of the Amended ECA have been met for the Site.**

This report should be submitted to the Ministry of the Environment and Climate Change as outlined in Section 14.0 of the Amended ECA.

- 2. The intended operational concept is to minimize the level of leachate on the liner at any one time to minimize the rate of migration of contaminants through the primary liner.**

It is recommended that efforts continue to limit the level of standing leachate on the liner to 0.5 m at any one time to be consistent with the design and operating concept. Leachate head levels were above 0.5 m through most of 2020 and 2021 at LS-2. The cause of the standing leachate should be investigated and remedied if possible.

- 3. Water continues to be observed in the HCL. No indication of leachate related impacts has been noted in the HCL to date.**

Any water trapped within the HCL should continue to be sampled for landfill related analytical parameters. Water quality from the HCL can provide an early warning of penetration of the Primary Liner by leachate.

- 4. There was no indication of landfill related degradation of the environment surrounding the Site (groundwater, surface water, air quality, noise).**

The monitoring program (as described throughout this report) should continue through 2022 to ensure that the Site does not have any adverse effects on its surroundings.

- 5. A rationalized groundwater and surface water monitoring program is included in the Amended ECA. This rationalized program has not yet been accepted for the Closed Facility. Due to the overlap between the Operating and Closed Facilities, GFL has continued with the former monitoring program at both sites.**

GFL should continue to implement the former monitoring program at the Operating Facility until the MECP approves the rationalized program for both Operating and Closed sites. Discussions between GFL and the MECP should continue in 2022.

7. Closure

This report is respectfully submitted in compliance with Operating Facility's amended ECA No. A181008. This report was prepared for the District Manager of Landfill Operations for the Operating Facility with input from the technical staff at the Site. This report was prepared for submission to the Ontario Ministry of Environment Conservation and Parks and may not be relied upon by any other person or entity without the written authorization of GHD or GFL. Any use or reuse of this document (or the findings and conclusions represented herein), by parties other than GFL is at the sole risk of those parties.

All of Which is Respectfully Submitted,

GHD Ltd.



Allan Molenhuis, P. Geo.



Ben Kempel, P. Geo.



Meghan O'Brien, P. Geo.

8. References

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- Newalta Industrial Services Inc. Operating Stoney Creek Landfill Provisional Certificate of Approval Annual Report – 2005.
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- Newalta Corporation Operating Stoney Creek Landfill, Provisional Certificate of Approval, Annual Report – 2009.
- Newalta Corporation Operating Stoney Creek Landfill, Provisional Certificate of Approval, Annual Report – 2010.
- Jackman Geosciences Inc., Terrapure Environmental Operating Stoney Creek Regional Facility, Environmental Compliance Approval No. A181008 – Annual Report 2016.

Tables

**Compliance Status Summary
2021 Annual Monitoring Report
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Stoney Creek, Ontario**

CONDITION	COMPLIANCE	COMPLIANCE STATUS
1 <u>EAA Definitions</u>	This section lists definitions	N/A
2 <u>EAA General Requirements</u>		
2.1 Comply with all EA conditions	All EA and EPA conditions are being complied with.	Yes
2.2 Public Document Provision	<p>The annual report is the only document to which this condition applies. This report is being distributed to:</p> <ul style="list-style-type: none"> * The Regional Director of the MOECC (now MECP) * The Clerk of the City of Hamilton (formerly the Region of Hamilton Wentworth) * The Medical Officer of Health for the City of Hamilton (formerly the Regional Municipality of Hamilton Wentworth) * the Valley Park Community Library * Members of the Stoney Creek Regional Facility Liaison Committee 	Yes
2.3 Financial Assurances	Financial Assurances are maintained each year	Yes
2.4 Yearly Report	This report fulfills the requirement.	Yes
2.4.1 Notice of the report availability	The Stoney Creek Regional Facility Liaison Committee will decide where the notice of availability will be publicized.	Yes
3.0 <u>EAA Technical Requirements</u>		
3.1 Every 5 years review 3R's technology with respect to landfill diversion	Included in this report.	Yes
3.2 Revise Aggregate Resource Act Plans	The Aggregate Resource Act plans were revised and re-issued in May 1997.	Yes

**Compliance Status Summary
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CONDITION	COMPLIANCE	COMPLIANCE STATUS
3.3 Highway Improvements	GFL has consulted with the Ministry of Transportation regarding intersection improvements and drainage issues. No permits or approvals are required until changes are proposed. No changes in 2021.	Yes
3.4 Landscaping Plans	A landscaping plan was developed in consultation with the Liaison Committee and the City of Stoney Creek and was approved by the Regional Director on April 30, 1997. A program of planting began in 1997 and was completed in 1998.	Yes
4.0 <u>EAA Ensure School Bus Safety</u>	GFL is responsible to ensure that Facility truck traffic routes do not adversely affect the level of school bus safety. The school board continues to be advised of any significant changes to GFL Environmental Facility truck traffic. No changes in 2021.	Yes
5.0 <u>EAA Corporation of City of Stoney Creek</u>	Stoney Creek amalgamated with the City of Hamilton on January 1, 2001	N/A
5.1 Agreement with City and Study Group on Impact Management and Compensation	An agreement, which included an Impact Management Program, was concluded with the Community members of the Study Group in September 1996 and another agreement was completed with the City of Stoney Creek on February 22, 1997. These agreements were amended on December 21, 2001.	Yes
5.2 Secondary Plan Development	GFL funded a Secondary Plan process by contributing \$100,000.00 to the development of the plan.	Yes
5.4 Environmental Protection Act Issues	The City of Stoney Creek and GFL came to an agreement on the terms and conditions of the EPA approval prior to the issuance of the Certificate on September 6, 1996.	Yes
5.5 Financial Assurance	A Financial Assurance package, prepared in compliance with MOECC guidelines was submitted to the Ministry on November 4, 1996. Amendments have been made to the financial assurance condition at various times.	Yes

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CONDITION	COMPLIANCE	COMPLIANCE STATUS
5.6 Hydrogeologic Modeling	This information was submitted in accordance with the Environmental Compliance Approval condition 57 on March 6, 1997.	Yes
5.7 West Quarry Landfill Closure and Remedial Works	The revised Environmental Compliance Approval for the Closed Stoney Creek Regional Facility was issued on September 6, 1996 prior to the issuance of the Operating Stoney Creek Regional Facility certificate in accordance with this condition.	Yes
5.8 Impact of Development South of the East Quarry	The assessment of this issue was submitted to the Director and City of Stoney Creek in August 1996.	Yes
5.9 Long Term Impact of Dewatering	The assessment of this issue was submitted to the Director and the City of Stoney Creek in August 1996.	Yes
5.10 Contingency Plan Development	This was completed and submitted to the Ministry of Environment in August 1996 in conjunction with the Financial Assurance Package.	Yes
6.0 <u>EAA Attempt to negotiate a royalty with the Region of Hamilton-Wentworth</u>	A royalty agreement was signed on December 21, 2001.	Yes
7.0 <u>EAA Compensation Agreement</u>	An agreement was signed with the Community members of the Study Group in September 1996.	Yes
8.0 <u>EAA Long-Term Study of Health Impacts</u>	The firm of Intrinsic Environmental Sciences Inc. has been retained to conduct the annual assessment as per the approved terms of reference. The 2021 report is included.	Yes

**Environmental Assessment Conditions Status Summary
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ECA A181008			Timing	
Condition Section	Description	Comments	Date Required	Compliance Status
1	Definitions		N/A	N/A
2 thru 7	General		N/A	Yes
8	Registration on Title prior to receipt of waste.	Registration of the ECA on Title was completed on December 2, 1996.	Dec. 3, 1996	Yes
9	Site designed, developed, and operated in accordance with Sch. A, and terms and conditions.	Cell 2 Approved on April 30, 1997 Cell 1b approved on June 8, 1998 Cell 3 approved on April 12, 1999. Cell 1c and 3b approved on May 4, 2001. Cell 6a approved on April 12, 2002. Cell 4 approved on May 30, 2003. Cell 5 and 6 approved on June 19, 2007. Cell 7A approved on April 30, 2011. Cell 7B approved on March 19, 2012. Expanded Cell 8A approved October 31, 2019	Ongoing	Yes
10	Wastes shall only be landfilled within the limits established by base grading plan shown in Item 63 - Figure 8 in Schedule A	Established by amendment November 22, 2013.	Ongoing	Yes
11	Minimum buffer area of 30 m maintained around the perimeter of fill area, buffer to be maintained with vegetative cover.		Ongoing	Yes
12	Prior to acceptance of waste, screening berms must be constructed as per Visual Impact Assessment. Landscape plan to be developed within six months of ECA issuance.	The landscape plan was approved by the Regional Director on April 30, 1997 Landscape plan completed October 1998	Dec. 4, 1996 Mar. 6, 1997	Yes
12.1	Details of Landscape Plan	Copy of plan is located on site.	Mar. 6, 1997	Yes
13	Detailed design of major works shall be approved by Director prior to construction.	See condition 9 above	Ongoing	Yes
14	The final detailed design to follow Item 2, Sch. A. Modifications clearly identified with explanation	Cell construction approval contains details of modifications, and minor modifications were approved by the District Office of the MECP	Ongoing	Yes
14.1	Major works - liner construction specs and QC program undertaken by 3rd party consulting firm	For all phases to date, this work has been conducted by Aecom (formerly Gartner Lee Ltd) and currently GHD Ltd.	Ongoing	Yes
14.2	Details on the monitoring, maintenance and repair of leachate system to be included in M&O manual.	Included in Maintenance and Operations Manual submitted to MECP March 6, 1997	Ongoing	Yes
14.3	Taro (GFL Environmental) shall construct major works in accordance with detailed designs as approved by the director.	Gartner Lee report submitted to MECP director for past phases. GHD reports submitted for current Phase 8A (Appendix F).	Ongoing	Yes

**Environmental Assessment Conditions Status Summary
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ECA A181008			Timing	
Condition Section	Description	Comments	Date Required	Compliance Status
14.4	Landfilling of wastes not to occur on liner until 3rd party inspection report indicates liner construction in accordance with ECA.	Gartner Lee report submitted to MECP director for Phase 1A on Oct 1, 1997, Phase 2 on Nov 10, 1997 and Phase 3 on December 9, 1999. Phase 1B on November 13, 2002. Phase 3B, 1C on December 3, 2003. Phase 3C, 4A on Oct 14, 2004, Phase 4B on Oct 18, 2005, Phase 4C on Oct. 20, 2006. Phase 4D on Oct. 5, 2007, Phase 5A on Sept. 26, 2008. Phase 5B and 6B on October 20, 2010, Phase 6C on November 11, 2011. GHD submitted report on Phase 8A on April 24, 2018.	Ongoing	Yes
15.1	Test pad for liner installation shall be constructed to ensure liner performance objectives	A test pad was constructed in July 1996 and the testing of this pad showed that the technical specifications could be met for the construction of the liner. Subsequently, the approval of Phase 1A was incorporated into the Environmental Compliance Approval issued on September 6, 1996.	N/A	Yes
15.2	Test pad constructed and tested prior to construction of the liner system.	See above	July. 1996	Yes
15.3	Results of the test pad testing submitted to the Director for review.	See above	Aug. 1996	Yes
16	Phase 1A constructed in accordance with Items 11, 12, 17 of Sch. A.	Gartner Lee Ltd. report re completion submitted to the MECP Oct. 1/97	NA	Yes
17	As built drawings shall be maintained on site for all major work components	maintained at site offices	Ongoing	Yes
18	On site roads, not within the landfilling area, shall be paved with asphalt.	All current roads have been paved with asphalt.	Ongoing	Yes
19	Taro (GFL Environmental) shall place a sign at main entrance and exit displaying name of site, ECA number, name of operator, hours of operation, telephone number for complaints, and 24 hr emergency number	Sign is in place.	Ongoing	Yes
20	Taro (GFL Environmental) to submit to OWRA application for surface/storm water management system. Application submitted following consultation with the city and CLC.	Approval granted May 1, 2008 Construction completed in April 2012	Ongoing	Yes
21	The maximum volume of waste and cover material which may be disposed of is 6,320,000 cubic metres. (Condition amended November 28, 2005)	Section 3.3 discusses the current landfill volume	Ongoing	Yes
22	The Facility site final contours shall not exceed those on Figure 5 in Item 63, Schedule A.	Established by amendment November 22, 2013	Ongoing	Yes
23	Annual tonnage limit not to exceed 750,000 tonnes, in any consecutive 12 month period, as calculated on a daily basis. Daily tonnage limit not to exceed 8,000 tonnes. Amendment January 18, 2013	2021 total tonnage: 534,586.67 tonnes Highest daily tonnage in 2021: 5,449.51 tonnes (November 23, 2021)	Ongoing	Yes

**Environmental Assessment Conditions Status Summary
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ECA A181008			Timing	
Condition Section	Description	Comments	Date Required	Compliance Status
24	Maximum number of waste vehicles not to exceed 250 per operating day.	Highest number of waste vehicles in one day: 210 (December 22, 2021)	Ongoing	Yes
25	Only wastes generated within the Province of Ontario may be received for disposal at this Site. Amendment January 18, 2013	Auditing procedures are in place to ensure compliance	Ongoing	Yes
26	Waste acceptance limited to solid, non-hazardous, commercial, institutional, and industrial waste including petroleum contaminated soils.	Waste control procedures in place and applied. MECP Environmental Officer conducts regular audits	Ongoing	Yes
27	No liquid industrial, hazardous, or putrescible wastes accepted.	Waste control procedures are outlined in Condition 34, Operations Manual	Ongoing	Yes
28	Company to take appropriate remedial action if at any time an adverse effect is generated by the site.		Ongoing	Yes
29	No waste shall be burned or incinerated at the site.		Ongoing	Yes
30	Hours of operation between 6:30 am and 6:00 pm. Waste receipt hours between 7:00 am and 5:00 pm.		Ongoing	Yes
31	During non-operating hours the site entrance and exit gates will be locked or secured.		Ongoing	Yes
32	Taro (GFL Environmental) shall ensure no queuing of waste vehicles shall occur on public roadways.		Ongoing	Yes
33	Taro (GFL Environmental) shall monitor the weight of waste receipts by using weigh scales. Estimates to be used when scales are down. Scales are to be calibrated annually.	Data is being recorded as part of daily records. Scale calibrated see Appendix H.	Ongoing	Yes
34.1	Maintenance and Operations manual to be submitted to the Regional Director for approval within 180 days of ECA issuance. Details of what manual shall include are described.	Manual submitted to MECP and was reviewed by CLC.	Mar. 6, 1997	Yes
34.2	Changes/revisions to the M&O manual to be approved by the Regional Director.		Ongoing	Yes
34.3	Access to site via Highway 20. Exit onto First Road West, south to Mud Street.		Ongoing	Yes
34.4	Taro (GFL Environmental) shall ensure that the primary haul route be Highway 20.		Ongoing	Yes
34.5	Taro (GFL Environmental) shall keep roads free of dirt and waste.	Road sweeper, truck wheel wash and road watering conducted.	Ongoing	Yes

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ECA A181008			Timing	
Condition Section	Description	Comments	Date Required	Compliance Status
34.6	Prior to a waste type being landfilled which is significantly different from a waste type landfilled in West Quarry in the past, Taro (GFL Environmental) shall inform the Regional Director, the CLC, and the City in writing of the new waste type proposed to be landfilled.	No new types of waste streams have been received	Ongoing	Yes
34.7	Taro (GFL Environmental) to ensure the site is inspected regularly by trained personnel.	See Inspection reports - Appendix I.	Ongoing	Yes
34.8	Taro (GFL Environmental) to take all reasonable steps to prevent off-site litter impacts	Checked on a daily basis.	Ongoing	Yes
35	Prior to discontinuation of pumping groundwater collection system, Taro (GFL Environmental) to submit application for approval to the Director, following City & CLC consultation.	Collection system on standby	Ongoing	Yes
36	Blasting associated with quarry to be complete within 4 years of ECA issuance.	Last quarry blast took place on Sept 1, 2000	Sept. 6, 2000	Yes
37	Minimum 100 m buffer between blasting and liner	Blasting is no longer conducted	Ongoing	Yes
38.1	No waste accepted, landfilled, or removed unless site supervisor is present.		Ongoing	Yes
38.2	Taro (GFL Environmental) to ensure all site employees are adequately trained on ECA requirements, site operations, waste management legislation, environmental concerns, health and safety concerns, and emergency procedures/contingency plans	Training was completed prior to the Facility opening.	Ongoing	Yes
38.3	Site deemed to be closed when a site supervisor is not present.		Ongoing	Yes
38.4	M&O manual is to be kept on site at all times.	maintained at offices	Ongoing	Yes
39.1	No leachate is to be discharged into the natural environment except as outlined in Item 4, Sch. A, Surface Water Impact Assessment.	This relates to stormwater management.	Ongoing	Yes
39.2	All collected leachate to be discharged to the Regional Sanitary Sewer or alternate accepted by Director.	All leachate discharged to City sanitary sewer.	Ongoing	Yes
39.3	Sewer Use Agreement is required if Taro (GFL Environmental) directs leachate to the Regional sanitary sewer system.	Sewer use agreement in place	Ongoing	Yes

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ECA A181008			Timing	
Condition Section	Description	Comments	Date Required	Compliance Status
40	Dust impacts from the site to be limited as indicated in Item 9, Sch. A.	Road sweeping, watering, and wheel wash in use on routine basis.	Ongoing	Yes
41	Taro (GFL Environmental) shall maintain a minimum of one water truck at the site for the purpose of mitigating dust impacts.		Ongoing	Yes
42	Taro (GFL Environmental) shall ensure all vehicles leaving the Facility pass through a wheel wash facility. Design of the facility to be approved prior to construction.	Temporary facility approved November 20, 1996. Permanent Facility approved Feb. 2, 1998	Ongoing	Yes
43	Facility required to operate within the noise level limits prescribed for Landfill Sites, MECP noise guidelines.	Monitoring conducted twice annually – early summer and early winter (approx. July and December).	Ongoing	Yes
44	Monitoring of sound normally 2 times per year during peak filling activity, within 5 m of final contour	Monitoring conducted twice annually – early summer and early winter (approx. July and December).	Ongoing	Yes
45	Site operations not to exceed noise impact set out in Item 63, Sch. A.	Modified from original by amendment November 22, 2013	Ongoing	Yes
46	Prior to Phase 7, Taro (GFL Environmental) to evaluate the extent of development within 500 m north of the northern property.		Revoked Nov. 22, 2013	NA
47	Prior to waste receipt Taro (GFL Environmental) is to submit a report on the proposed noise monitoring program to Director	Program was approved by MECP on Sept.5, 1997	Dec. 4, 1996	Yes
48	All on site equipment shall comply with noise emission standards NPC-118, NPC-115	All equipment complies with noise emission standards	Ongoing	Yes
49	Construction and removal of noise mitigating berms for each cell shall be in accordance with a plan to be prepared by a qualified noise consultant.		Ongoing	Yes
50	Noise mitigating berms constructed such that line of sight is broken between a receiving point of 1.5 m above grade at any residence and a point amongst the operating face equipment, 4 m above the highest fill elevation at the location.	Current noise monitoring indicates that the use of noise mitigating berms was not needed as the noise levels are below the background levels at the nearest receptors	Ongoing	Yes
51	Daily records maintained at the site at all times.		Ongoing	Yes
52	Taro (GFL Environmental) to maintain a written record of site inspections.	See Appendix I	Ongoing	Yes
53	Site Inspection Records to be maintained on site for 2 years.		Ongoing	Yes
54	Annual report required by June 30 each year	This report fulfills the requirement.	Ongoing	Yes

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55.1	Any damaged groundwater monitoring wells shall be assessed, repaired, replaced, or decommissioned as required.	Monitoring Well maintenance is ongoing. Wells are repaired or replaced as needed.	Ongoing	Yes
55.2	All monitoring wells shall be properly capped, locked, and protected from damage.		Ongoing	Yes
55.3	Decommissioning of abandoned groundwater monitor wells is to be approved by the Regional Director, and carried out in good standard practices that will prevent contamination through the abandoned monitor		Ongoing	Yes
55.4	Taro (GFL Environmental) shall replace any monitoring wells which are destroyed, such that no more than one sampling event is missed.		Ongoing	Yes
56	Within 180 days of ECA issuance, Taro (GFL Environmental) shall provide to the Director a plan for monitoring and assessment of the horizontal and vertical extent of the West Quarry impacted groundwater plume beneath the East Quarry Landfill.	The report was submitted to the Director on March 4, 1997	Mar. 6, 1997	Yes
57	Within 180 day of ECA issuance, Taro (GFL Environmental) shall submit a report to the Director on the ground water modeling performed on the site.	The report was submitted to the Director on March 4, 1997.	Mar. 6, 1997	Yes
58.1	Taro (GFL Environmental) shall provide monitoring in accordance with Schedules B, C, D, E, F, and G.		Ongoing	Yes
59	Taro (GFL Environmental) shall conduct air sampling during the months of June to August for a scan of VOC parameters. Monitoring results shall be submitted to the District Office as soon as practicably possible.	No longer required.	-	Yes
60	All monitoring data will be made available to the CLC and the City as soon as practicable.	Annual monitoring report includes all relevant data in a tabulated and interpreted form.	Ongoing	Yes
61	Any changes to the monitoring programs shall be done in consultation with the CLC and City prior to being submitted to the Regional Director for approval.	Several monitoring well replacements and additional background monitoring wells were incorporated into the monitoring program in 2020. See report.	Ongoing	Yes
62	If noise or dust impacts are a concern, Taro (GFL Environmental) shall implement contingency measures in accordance to the Director's requirements.	Not currently an issue.	Ongoing	Yes

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63.1	If the monitoring programs listed in Sch. D or F indicate off-site exceedance of PWQO, ODWO, or Reasonable Use Guidelines, Taro (GFL Environmental) shall include in the annual report modifications, details and discussions of preventative measures	There were no exceedances related to the Operating Stoney Creek Regional Facility during the current reporting period.	Ongoing	Yes
64	Contingency plans relating to groundwater impacts shall be as described in Items 2, 3, and 15 of Sch. A.		Ongoing	Yes
65	Contingency plans relating to surface water impacts shall be as described in Item 4, Sch. A.		Ongoing	Yes
66	Contingency plans relating to landfill gas impacts shall be as described in Items 2, and 16, Sch. A.		Ongoing	Yes
67	Any changes to the groundwater or surface water trigger levels shall be done in consultation with the City and the CLC prior to submission to the Director for approval.	This report includes updated trigger levels calculated using background water quality results from the additional well nest 77.	Ongoing	Yes
68	If the monitoring programs indicate an off-site exceedance of the PWQO, ODWO or Reasonable Use Guidelines, Taro (GFL Environmental) shall notify the Director, CLC, and the City regarding details of the exceedance, timing and extent of contingency measures, and any modifications to the monitoring programs.	There were no exceedances related to the Operating Stoney Creek Regional Facility during the current reporting period.	Ongoing	Yes
69	Taro (GFL Environmental) is to reimburse the Crown for costs incurred by the crown to retain an Environmental Inspector.	The MECP discontinued the Facility Inspector Position at the end of 2011 and replaced it with increased inspections at GFL Environmental Transfer Stations.	Ongoing	Yes
70	The Company is to establish and maintain a Facility Liaison Committee in accordance with Terms of Ref described in Schedule I	Original condition Revoked April 16, 2008 Replaced with new condition #70 on April 16, 2008	N/A	N/A
71	Outlines general mandates of the CLC to review and provide recommendations on annual operating and monitoring reports, and on complaints and complaint handling procedures.	Condition Revoked April 16, 2008	N/A	N/A
72	Outlines CLC membership availability as two reps from Taro (GFL Environmental), one from the City, one from the Region, one from the MOECC, two community reps from within 1,500 m the MOECC, two community reps from within 1,500 m haul route.	Condition Revoked April 16, 2008	N/A	N/A

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73	The CLC shall prepare Terms of Reference for the CLC. A copy of this shall be submitted to the Regional Director, and a copy shall be made publicly available.	Condition Revoked April 16, 2008	N/A	N/A
74	Taro (GFL Environmental) shall provide \$10,000 annually for CLC administration. Costs to be reviewed every 5 years.	Condition Revoked April 16, 2008	N/A	N/A
75	Taro (GFL Environmental) shall provide to the CLC and the City access to non-proprietary documents.		Ongoing	Yes
76	Taro (GFL Environmental) shall allow CLC and City reasonable access to the site		Ongoing	Yes
77	Taro (GFL Environmental) in conjunction with the CLC and the City shall establish a public complaints procedure.	A complaints procedure was included in the Maintenance and Operations Manual and has since been reviewed and revised by the CLC.	Ongoing	Yes
78	Summary of the complaints procedure shall be forwarded to all properties within 1000 m of the site property.	Sent in CLC newsletter in May 1997.	N/A	Yes
79	Closure plan required 2 years prior to proposed Closure date		N/A	Yes
80	Closure plan to be designed in consultation with the City, CLC, and the HRCA prior to submission for approval.		N/A	Yes
81	Financial Assurance required in form suitable to the Director and in an amount that is sufficient to pay for compliance with and performance of any action related to the closure and post closure. The City and NHLLC shall be advised.	Condition amended in April 2008 to include notification of NHLLC and City of financial assurance amendments.	Schedule H	Yes
82	Financial Assurance submitted in one of the following forms: cash, letter of credit, surety bond, insurance policy or some other form, all satisfactory to the Director.	See Appendix C	N/A	Yes
83	Reference to ECA No. 181008 to be included on any financial assurance correspondence to the Director		N/A	Yes
84	Financial Assurance shall be as outlined in Items 19 and 20 of Sch. A.	See Condition 85.	Ongoing	Yes
85.1	Within 60 days of ECA issuance, Taro (GFL Environmental) shall provide financial assurance in the amount of \$10,955,237 to the Director	Condition 85 was amended on October 12, 2010. Schedule H2 was revoked.	12-Oct-10	Yes
85.2	The amount of Financial Assurance is subject to review at any time by the Director.			

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86	If financial assurance is provided via an insurance policy, conditions 13.6 Item 20, Sch. A must be met.	This was completed as part of the August 1996 Financial Assurance proposal and subsequent submission of Financial Assurance on Nov. 4, 1996.	N/A	Yes
87	If financial assurance is not renewed within 60 days of expiry, it is to be replaced with a cash deposit.		N/A	Yes
88.1	Taro (GFL Environmental) shall submit an application regarding the review and amendment of the financial assurance to the Director for approval. Details of what should be included in the application are outlined.	Review was submitted and MECP agreed to revisions.	N/A	Yes
88.2	Copy of application shall also be provided to the City and the CLC.	Provided at the LC meeting July 17, 2002 Condition revoked April 16, 2008	N/A	N/A
89	Taro (GFL Environmental) shall assess the need for pumping of the groundwater collection system in Year 10 and for each subsequent financial assurance review.	Groundwater collection system completed and is in standby in case it is needed during liner construction	Sept. 6, 2016	Yes
90	The temporary wheel wash facility shall be installed and operational prior to waste acceptance.	Temporary wheel wash in place for the December 4, 1996 opening of the Facility	Dec 4. 1996	Yes
90.1	The Company remains responsible for performance of all conditions under conditions of reorganization or ownership change.	Financial assurance is in place	N/A	Yes
90.2	The financial assurance provided by the Company, or any successor, shall be kept in good standing by the Company until the Director has given notice in writing that he has accepted the substitute financial assurance.	Financial assurance is in place	N/A	Yes
91	The final design details for the permanent wheel wash facility shall be submitted prior to June 30, 1997.	MECP received application on June 27, 1997	30-Jun-97	Yes
92	The annual report shall contain a summary of the landscape plan works completed during the previous year and work scheduled for the next year.	The landscape plan was approved by the Regional Director on April 30, 1997 and was implemented by Parkside Landscaping. Landscaping was completed October 1998.	N/A	Yes
92	Sufficient funds from the operating revenue of the active Taro (GFL Environmental) Landfill shall be used for the costs of closing, monitoring and maintenance of the closed West Landfill.	Condition null as a result of separate financial assurance being put in place for Closed Facility.	Ongoing	Yes
92(1)	Sufficient funds means as a minimum, the costs associated with the closure, monitoring and maintenance of the West Landfill.	See above	Ongoing	Yes

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92(2)	Condition 92 becomes null and void in its entirety upon submission of financial assurance in a form and amount acceptable to the Director that provides for sufficient funds for the closure, monitoring and maintenance of the West Landfill.	See above	Ongoing	Yes
94	No discharge of leachate to the Hamilton sanitary sewer until conditions 95 and 96 are approved in writing by the Director.	Approved by the MECP Director June 4, 2002	4-Jun-02	Yes
95	The Company shall obtain an agreement with the City of Hamilton to permit discharge of leachate to the sanitary sewer system; the agreement shall contain a provision for the hold back of leachate during by-pass or upset conditions at the Woodward Treatment plant.	See Above		Yes
96	Leachate shall not be discharged to the sewer until an evaluation of the impact of the combined leachate from the East and West landfills on the Woodward treatment plant has been conducted and is acceptable to the City of Hamilton.	See Above		Yes
97	Leachate discharge from the landfill shall be in compliance with the City of Hamilton sewer use by-law.	Compliance agreement in place	Ongoing	Yes
98	The Company shall establish a health subcommittee of the NHLLC, consisting of one Company member, one community member and a representative of the local Health Department	Condition amended April 16, 2008 - Health Subcommittee struck and reviewed need for Health Study with Public Health Department, City of Hamilton.	Ongoing	Yes
99	If deemed necessary by both Health Subcommittee and NHLLC, T of Ref shall be submitted to the Director for approval.	Condition amended April 16, 2008 - In 2012 Subcommittee deemed Health Study unnecessary.	N/A	Yes
100	The Company shall assess the need for monitoring the landfill leachate for a full scan of organic compounds, including PCB's, furans and dioxins	Included in the 2002 Annual Report	30-Jun-02	Yes
101	By November 17, 2002, submit a phased capping schedule, and when approved by the Director, implement the plan.	Submitted on November 15, 2002	17-Nov-02	Yes
102	The practice of recirculating leachate by spraying at the Taro (GFL Environmental) Landfill shall not be permitted.	Spraying was discontinued in 2000	17-Nov-02	Yes
103	The Company shall arrange with the Chair of the Environmental Review Tribunal to conduct a public process to develop revised terms of reference for the CLC.	This condition was revoked by the Environmental Tribunal April 16, 2008	N/A	N/A

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104	Approval to use imported soil for liner construction	Approved Mar 6, 2003	6-Mar-03	Yes
107	Approval of Liner phases 5 and 6	Approved June 22, 2007	N/A	Yes
108	Stage 1 Closure Plan and exit relocation approval		9-Oct-12	Yes
109	Approval for reduction in size of Liner Cell 8	Condition under review in light of liner reconfiguration approval	N/A	Yes
110	Approval to receive and dispose of non-hazardous incinerator ash	The wording of condition 27 was amended to allow for receipt of this material	ongoing	Yes
111	Develop and maintain Dust Contingency Program to minimize impacts from disposal of incinerator ash.	Dust management plan contained in Maintenance and Operations manual and is ongoing	ongoing	Yes
112	Ensure through testing that the incinerator ash received is non hazardous	Testing is ongoing	ongoing	Yes
113	Summarized results of the testing required in condition 112 to be included in Annual Reports.	Results are to be included in the Annual Report under condition 54	ongoing	Yes
114	Submit Phase 2 landfill cover construction report to Director within 120 days of construction completion.	Construction ongoing	ongoing	Yes
115	Approval for the Phase 8 West Sidewall and Groundwater Collection System	Appendix F includes construction details.	ongoing	Yes

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1.0	General			
1.1	Owner shall ensure any person authorized to carry out work on or operate any aspect of the site is notified of the Approval and its conditions and shall ensure the person complies.		Ongoing	YES
1.2	Any authorized person (see 1.1) shall comply with conditions of this Approval.		Ongoing	YES
1.3	Site shall be designed, developed constructed, operated, and maintained in accordance with documentation in Schedule A, except as otherwise provided for in this approval.	Cell 2 Approved on April 30, 1997 Cell 1b approved on June 8, 1998 Cell 3 approved on April 12, 1999. Cell 1c and 3b approved on May 4, 2001. Cell 6a approved on April 12, 2002. Cell 4 approved on May 30, 2003. Cell 5 and 6 approved on June 19, 2007. Cell 7A approved on April 30, 2011. Cell 7B approved on March 19, 2012. Expanded Cell 8A approved October 31, 2019	Ongoing	YES
1.4	<p>Issuance and compliance with this Approval does not:</p> <ul style="list-style-type: none"> • Relieve any person of obligation to comply with the EPA or other applicable statute, regulation, or other legal requirement • Limit the authority of the Ministry to require certain steps be taken or request further information related to compliance with this Approval be provided to the Ministry. <p>Unless a provision of this Approval specifically refers to the other requirements or authority and clearly states that the other requirement or authority is to be replaced or limited by this Approval.</p>	Compliance with the EPA, EAA, and other legal requirements continues	Ongoing	YES
1.5	Owner or Operator remains responsible for any contravention of Approval conditions, applicable statutes, regulations, or legal requirements resulting from acts or omissions that cause adverse effects or impairments of air/water quality.		Ongoing	YES
1.6	Information requested by the Director or a Provincial Officer concerning the Site shall be provided in a timely manner.		N/A	YES

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1.7	The receipt of information by the Ministry or failure of the Ministry to prosecute any person in relation to the information shall not be construed as: <ul style="list-style-type: none"> • An approval, waiver, or justification by the Ministry of acts/omissions of any person that contravenes Approval conditions or other legal requirements • Acceptance by the Ministry of the information's completeness/accuracy 	Acknowledged	N/A	YES
1.8	Information related to this Approval and contained in Ministry files may be made available to the public.	Acknowledged	N/A	YES
1.9	This Approval revokes and replaces previous Approval and all subsequent amendments.	Acknowledged	N/A	YES
1.10	Where conflict exists between a provision of any document and the conditions of this Approval, the conditions of this Approval take precedence.	Acknowledged	N/A	YES
1.11	Where conflict exists between the application and a provision in any Schedule A document, the application takes precedence unless the purpose of the document was to amend the application and it was approved by the Ministry in writing.	Acknowledged	N/A	YES
1.12	Where there is a conflict between two Schedule A documents, other than the application, the most recent document takes precedence.	Acknowledged	N/A	YES
1.13	The conditions of this Approval are severable.	Acknowledged	N/A	YES
1.14	No person having an interest in the site shall deal with the Site in any way without first giving a copy of this Approval to each person acquiring an interest.		N/A	YES
1.15	If additional land is acquired that will be included in the site, two copies of a Certificate of Requirement shall be submitted to the Director within 60 days of a notice being issued.		N/A	YES

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1.16	If additional land is acquired (see 1.15), the Certificate of Requirement shall be registered to the appropriate land registry office and a duplicate copy shall be sent to the Director within 10 days of the receipt of the Certificate of Requirement.		N/A	YES
1.17	No portion of the Site shall be transferred or encumbered unless the Director is notified in advance and is satisfied that Approval conditions will be met.		N/A	YES
1.18	The Owner shall notify the Director in writing and forward a copy to the District Manager within 30 days of the occurrence of changes to: <ul style="list-style-type: none"> • Ownership of Site • Operator of Site • Address of Owner or Operator • Partners, where Owner or Operator is or becomes a partnership • Name of the corporation where Owner or Operator is or becomes a corporation, other than a municipal corporation 		N/A	YES
1.19	If Site ownership changes, other than a change to a successor municipality, the Owner shall notify the succeeding owner of the existence of this Approval in writing. A copy shall be forwarded to the Director or District Manager.		N/A	YES
1.20	No person shall hinder/obstruct a Provincial Officer from carrying out inspections authorized by the EPA or PA.		N/A	YES
1.21	The Owner shall ensure all communication made pursuant to this Approval will refer to Approval No. A 181008.		N/A	YES
2.0	Financial Assurance			
2.1	Financial assurance (FA) shall be provided for the Site as required by the Director, in an amount that is sufficient to pay for compliance with and performance of any action specified in this Approval. The Owner shall provide regular updates to the CLC and the City regarding the value of the FA.		Ongoing	YES

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2.2	FA may be provided in cash, irrevocable letters of credit, surety bonds or other forms satisfactory to the Director.		N/A	YES
2.3	The Owner shall ensure the method for calculating the inflation rate for the FA re-evaluation is the current approach deemed acceptable by the Ministry.		N/A	YES
2.4	The Owner shall ensure the method for calculating the discount rate for the FA re-evaluation is the current approach deemed acceptable by the Ministry.		N/A	YES
2.5	(1) The Owner shall ensure the Director has \$29,251,559.00 in financial assurance for the Site. (2) The Owner shall provide the Ministry financial assurance (total amount, not additional amount) as follows: Dec. 31, 2020 - \$30,532,581.00 Dec. 31, 2021 - \$31,813,604.00 Dec. 31, 2021 - \$33,094,626.00		Dec. 31, 2019 Ongoing	YES
2.6	(1) A revised or new FA Re-Evaluation Report is to be submitted to the Director every three years beginning March 31 st , 2022. It shall include: <ul style="list-style-type: none"> • Updates of discount, interest, and inflation rates • A report prepared by a Professional Engineer which updates the cost estimates (2) Beginning March 31 st , 2022, the Owner shall prepare and maintain an updated re-evaluation of the amount of FA required to implement the actions required under Condition 2.5 for the years where a re-evaluation is not required. (3) The amount of FA is subject to review at any time by the Director and may be amended at their discretion.		Mar. 31, 2022; Ongoing Mar. 31, 2022	YES

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2.7	<p>(1) The report described in 2.6 shall include:</p> <ul style="list-style-type: none"> • Amount of waste landfilled • Projected rate of fill • Capping of completed fill areas • Empirical leachate generation rates • Recalculation of Contaminating Lifespan of Site • Any measures carried out to ameliorate adverse effects • Annual inspection, maintenance, and monitoring costs <p>(2) If contingency measures were carried out, the report will describe the remaining contingency measures to be carried out.</p>		N/A	YES
2.8	Waste shall not be received, accepted, disposed, or transferred unless FA is received.		N/A	YES
3.0	Community Liaison Committee			
3.1	The continuance, mandate, membership, operation, and funding of existing Stoney Creek Regional Facility Community Liaison Committee (CLC) shall be completed according to the Terms of Reference in Schedule G.		N/A	YES
3.2	A copy of the Terms of Reference for the CLC shall be publicly available.		N/A	YES
3.3	The Owner shall provide the CLC and the City with access to non-proprietary documents (including consulting reports) and will provide copies of the annual reports required to be submitted to the Director and Regional Director.		N/A	YES
3.4	The Owner shall allow the CLC and the City reasonable access to the Site.		N/A	YES
3.5	The Owner in conjunction with the CLC and the City will maintain a public complaints procedure (see Amended ECA).		N/A	YES

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4.0	Construction, Installation and Planning			
4.1	The following are considered Major Works: <ul style="list-style-type: none"> • Liner • Leachate Collection System • Groundwater Collection Trench • Final Cover • Stormwater Management System 	Acknowledged	N/A	-
4.2	(1) A final detailed design shall be prepared for each Major Work to be constructed at the Site. (2) Specifications and a QA/QC program for construction of Major Works will be handled by a third-party consulting firm.		Ongoing	Yes
4.3	The final detailed designs shall include: <ul style="list-style-type: none"> • Design and drawing specifications • A detailed QA/QC program • Details on monitoring, maintenance, repair, and replacement of engineered components 		Ongoing	YES
4.4	Design modifications inconsistent with conceptual design shall be identified and explained.		Ongoing	YES
4.5	Each major work shall be constructed in accordance with approved final detailed design and QA/QC procedures will be implemented.		Ongoing	YES
4.6	As-builts will be retained on Site.		Ongoing	YES
4.7	Six months prior to the anticipated completion of landfilling in each stage of the Site, a final detailed design for the subsequent stage will be submitted to the Director.		Ongoing	YES
4.8	No landfilling shall occur on the liner until an inspection report from a third party is received.		Ongoing	YES
5.0	Site Operations			
5.1	The Site shall be properly operated and maintained at all times.		Ongoing	YES
5.2	Guideline B-7, Reasonable Use Concept, will be applied at site boundaries.		Ongoing	YES

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5.3	<p>An Operations, Maintenance and Procedures manual will be retained at the Site and reviewed on an annual basis. Manual will include:</p> <ul style="list-style-type: none"> • Health and safety • Operation and maintenance of the Site • Waste disposal area and development • Nuisance management • Leachate management • Landfill gas management • Surface water/Storm water management • Inspections and monitoring • Contingency plans and emergency procedures • Complaints • Reporting and record keeping <p>Revisions to the manual will be submitted to the Director for approval before implementation.</p>		Ongoing	YES
5.4	A buffer area of 30 m width with a vegetative cover will be maintained around the perimeter of the approved area.		Ongoing	YES
5.5	<p>The Owner shall place a sign at the Site entrance and exit, legible from a 25 m distance, that will display:</p> <ul style="list-style-type: none"> • The name of the Site and Owner • The number of the Approval • The name of the Operator • The normal hours of operation • A warning against unauthorized access • The telephone number to which complaints may be directed • A twenty-four (24) hour emergency telephone number • A warning against dumping outside the Site 		Ongoing	YES
5.6	Waste may be received Monday through Friday from 7:00AM to 5:00PM. Site operating hours shall be 6:30AM to 6:00PM Monday through Friday. The Site shall be closed weekends and statutory holidays. Amendment to the hours of operation requires Director approval.		Ongoing	YES

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5.7	With prior written approval of the District Manager, the time periods in Condition 5.6 may be extended to accommodate seasonal or unusual quantities of waste.		Ongoing	YES
5.8	Contingency actions and emergency response may take place outside usual hours.		Ongoing	YES
5.9	During non-operating hours, entrance and exit gates will be locked.		Ongoing	YES
5.10	Queuing of waste vehicles shall not occur on public roadways.		Ongoing	YES
5.11	The Owner shall monitor waste received using weigh scales. If way scales are out of operation, estimates of waste volumes and density shall be used. Weigh scales will be installed prior to receiving any waste and will be recalibrated annually.		Ongoing	YES
5.12	No waste shall be accepted, landfilled, or removed from the Site unless a Site supervisor or trained designate is present.		Ongoing	YES
5.13	Site shall be accessed from Site entrance from Upper Centennial Parkway and Site exit onto First Road West to Mud Street.		Ongoing	YES
5.14	Trucks shall use the Upper Centennial Parkway as the primary haul route to and from the Site. Site access shall be refused to trucks found to be in continuous non-compliance.		Ongoing	YES
5.15	First Road West shall be kept free of dirt and waste.		Ongoing	YES
5.16	If a waste type being landfilled is significantly different from a waste type landfilled in the West Quarry in the past, the Owner shall inform the Regional Director, the CLC and the City in writing.		Ongoing	YES
5.17	The Site shall be operated and maintained so that vermin, vectors, dust, litter, odour, noise, and traffic are not a nuisance.		Ongoing	YES
5.18	The Owner shall take all practical steps to prevent off-site litter impacts.		Ongoing	YES

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5.19	Site is required to operate within noise level limits prescribed in the Ministry's "Noise Guidelines for Landfill Sites".		Ongoing	YES
5.20	Sound level monitoring of daily activity shall occur twice annually and relate to periods of peak filling activity within 5 m of final contours of the Site. Monitoring will be conducted at locations in Item 6, Schedule "A". Hourly Leq measurements will be taken for five hourly periods at each location between 7:00 and 19:00. All measurements will be reported for Varying Sound.		Ongoing	YES
5.21	Site should be operated to not exceed predicted noise impact (Item No. 6, Sch. "A"), and in any event, not exceed the Ministry's landfill noise guidelines.		Ongoing	YES
5.22	The Owner may apply to the Director for approval of alternate noise attenuation methods. The application must be accompanied by a noise impact assessment.		Ongoing	YES
5.23	All on-site equipment shall comply with the Publications NPC-115 and NPC-118 of the Ministry's Model Municipal Noise Control By-Law.		Ongoing	YES
5.24	The Owner shall comply with noise criteria in Ministry Guideline "Noise Guidelines for Landfill Sites" and the Site shall comply with Publication NPC-300.		Ongoing	YES
5.25	Prior to the discontinuation of pumping of the groundwater collection system, the Owner shall submit an application to the Director for approval, following consultation with the CLC and the City.		Ongoing	YES
5.26	All appropriate measures will be taken to minimize surface water contact with waste. Temporary berms and ditches shall be constructed around active waste disposal areas.		Ongoing	YES
6.0	Landfill Operations			
6.1	Waste received is restricted to solid, non-hazardous commercial, institutional, and industrial waste, including petroleum contaminated soils.		Ongoing	YES

Environmental Assessment Conditions Status Summary
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
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ECA A181008			Timing	
Condition Section	Description	Comments	Date Required	Compliance Status
6.2	No liquid industrial wastes, hazardous wastes or putrescible wastes shall be disposed of in the waste disposal fill area of the Site.		Ongoing	YES
6.3	Receipt and disposal of non-hazardous incinerator ash shall be done in accordance with "Waste Control Procedures", detailed in Sch. "A", Item 49.		Ongoing	YES
6.4	Owner shall develop, implement, and maintain a Dust Contingency program.		Ongoing	YES
6.5	Owner shall ensure incinerator ash received at the Site is non-hazardous through testing prescribed in O. Reg. 347.		Ongoing	YES
6.6	Summary of testing results of Condition 6.5 shall be included in the reports required in Condition 14.1.		Ongoing	YES
6.7	Asbestos waste shall be handled in accordance with Section 17 of O. Reg. 347.		Ongoing	YES
6.8	A suitable sized excavation for asbestos waste shall be made by the Owner away from active landfilling face.		Ongoing	YES
6.9	All asbestos waste shall be inspected to ensure waste is properly bagged/contained and free from punctures, tears, or leaks.		Ongoing	YES
6.10	Asbestos waste shall be placed in the excavation to avoid damage to the containers.		Ongoing	YES
6.11	125 cm of cover or waste material shall be placed over the asbestos.		Ongoing	YES
6.12	All asbestos waste shall be deposited no higher than 1.25 m below the disposal area elevation.		Ongoing	YES
6.13	Maximum volume of waste and cover materials, excluding final cover, that may be disposed of at the Site is 10,180,000 m ³ .		Ongoing	YES
6.14	Annual tonnage of waste received shall not exceed 750,000 tonnes in any consecutive 12-month period. Maximum daily tonnage of waste received shall not exceed 8,000 tonnes.		Ongoing	YES

**Environmental Assessment Conditions Status Summary
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ECA A181008			Timing	
Condition Section	Description	Comments	Date Required	Compliance Status
6.15	Maximum number of waste vehicles depositing the Site shall not exceed 250 per day.		Ongoing	YES
6.16	No waste shall be landfilled outside the limits of the base and final cover contours (see Item 57, Sch. "A"). No waste shall be disposed of within the buffer lands.		Ongoing	YES
6.17	At least two meters of compacted waste and cover material shall be maintained between any landfilled sludge and the granular leachate collection layer.		Ongoing	YES
6.18	Only waste generated in Ontario may be disposed of at the Site.		Ongoing	YES
6.19	All loads of waste must be inspected by Site personnel prior to disposal.		Ongoing	YES
6.20	Burning of waste at the Site is prohibited.		Ongoing	YES
6.21	a. No leachate and/or contaminated water shall be discharged to the natural environment, except as outlined in Item 3, Sch. "A". b. All leachate and/or contaminated water shall be discharged to the City sanitary sewer or an alternative acceptable to the Director. c. If Owner discharges leachate and/or contaminated water to the City sanitary sewer system, the Owner shall obtain and maintain an agreement with the City that specifies permissible quality and quantity of leachate and outlines monitoring and reporting requirements.		Ongoing	YES
6.22	The Owner shall limit dust impacts using control measures as indicated in Item 7, Sch. "A".		Ongoing	YES
6.23	A minimum of one watering truck shall be maintained at the Site for dust mitigation.		Ongoing	YES
6.24	All vehicles leaving landfilling area shall pass through a wheel washing facility.		Ongoing	YES
6.25	The Owner shall ensure that an agreement in writing with the City is in place in case of discharge of leachate from the Site to the City's sanitary sewer.		Ongoing	YES

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ECA A181008			Timing	
Condition Section	Description	Comments	Date Required	Compliance Status
6.26	Recirculating leachate by spraying shall not be permitted.		Ongoing	YES
6.27	The Site is not required to collect landfill gas.		Ongoing	YES
7.0	Major Works and Construction Approvals			
7.1	Expansion of the Site shall proceed in 4 phases in accordance with Item 57, Sch. "A". Phase 1 is approved. Prior to Phases 2-4, approval of the detailed design is required in accordance with Condition 4.		Ongoing	YES
8.0	Inspections and Records			
8.1	Daily records shall be maintained at the Site (see Amended ECA)		Ongoing	YES
8.2	The Owner shall maintain written record of Site inspection (see Amended ECA).		Ongoing	YES
8.3	The Owner shall conduct inspections as outlined in Schedule "B".		Ongoing	YES
8.4	A record of inspections shall be kept in a daily logbook and include: <ul style="list-style-type: none"> • The name and signature of the person that conducted the inspection • The date and time of the inspection • The list of any deficiencies discovered • The recommendations for remedial action • The date, time and description of actions taken 		Ongoing	YES
8.5	A record shall be kept in a daily log book of all refusal of waste shipments, the reasons for refusal and the origin of the waste, if known.		Ongoing	YES
8.6	Site inspection records shall be kept in the form of a written log or a dedicated electronic file.		Ongoing	YES
8.7	A record will be maintained for each client disposing of solid non-hazardous waste at the Site and will include a description of the waste and documentation to demonstrate hazardous or liquid industrial waste is not disposed of at the Site.		Ongoing	YES

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ECA A181008			Timing	
Condition Section	Description	Comments	Date Required	Compliance Status
8.8	All records will be retained at the Site for two years.		Ongoing	YES
8.9	All documentation listed in Sch. "A" shall be retained for as long as this Approval is valid.		Ongoing	YES
8.10	All monthly Site inspection reports are to be kept at the Site until they are included in the Annual report.		Ongoing	YES
8.11	The Owner shall retain employee training records as long as the employee is working at the Site.		Ongoing	YES
8.12	All of the above documents shall be available for inspection upon request of Ministry staff.		Ongoing	YES
8.13	The Owner shall retain copies of the annual reports referred to in the preceding conditions and any associated documentation for at least two years after the closure of the Site.		Ongoing	YES
9.0	Training			
9.1	A training plan for all employees that operate any aspect of the Site shall be developed and implemented by the Operator. Only trained employees shall operate any aspect of the Site.		Ongoing	YES
10.0	Complaints Procedures			
10.1	If complaints regarding the operation of the Site are received, the Owner shall respond as per the SOP for the Site.		Ongoing	YES
11.0	Emergency Situations			
11.1	In the event of a reportable spill of discharge of a contaminant to the environment, Site staff shall contact the Ministry's Spills Action Centre, the Ministry's District Office, and the City's Spills Response Line.		Ongoing	YES
11.2	The Owner shall submit a written report of the spill/incident to the District Manager within three days.		Ongoing	YES
12.0	Monitoring			
12.1	Groundwater monitoring wells shall be properly capped, locked and protected from damage.		Ongoing	YES

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ECA A181008			Timing	
Condition Section	Description	Comments	Date Required	Compliance Status
12.2	Where landfilling is to proceed around monitoring wells, wells must be decommissioned in accordance with O. Reg. 903.		Ongoing	YES
12.3	Any groundwater monitoring wells in the monitoring program shall be assessed, repaired, replaced, or decommissioned as required.		Ongoing	YES
12.4	The Owner shall repair or replace monitoring wells that are destroyed or damaged within one year.		Ongoing	YES
12.5	Monitoring wells no longer required as part of the groundwater monitoring program shall be decommissioned in accordance with O. Reg. 903. A report on the decommissioning shall be provided in the annual monitoring report.		Ongoing	YES
12.6	The Owner shall provide monitoring in accordance with the following: <ul style="list-style-type: none"> • The performance of the engineered control systems of the Site in accordance with Sch. "B" • Leachate production and quality in accordance with Sch. "C" • Surface water flow and quality in accordance with Sch. "D" • Levels of landfill gases in accordance with Sch. "E" • Groundwater in accordance with Sch. "F" • Noise levels as per Condition 5.20 		Ongoing	YES
12.7	All monitoring data will be made available to the CLC and the City.		Ongoing	YES
12.8	Changes to the monitoring programs shall be done in consultation with the CLC and the City prior to being submitted to the Director for approval.		Ongoing	YES
12.9	If determined by the Regional Director that noise and/or dust levels must be reduced or further controlled, the Owner shall implement contingency measures where practicable.		Ongoing	YES

**Environmental Assessment Conditions Status Summary
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Stoney Creek, Ontario**

ECA A181008			Timing	
Condition Section	Description	Comments	Date Required	Compliance Status
12.10	<p>If off-site exceedances of the PWQO, ODWO or the Reasonable Use Guideline are predicted to occur in the monitoring programs listed in Schedules D or F, the Owner shall include the following in the annual monitoring report:</p> <ul style="list-style-type: none"> • Details of any predicted off-site exceedance • A discussion of modifications to intended operations to prevent the off-site exceedance • A discussion of modifications to the monitoring program • A discussion of other mitigation measures 		Ongoing	YES
13.0	Contingency Plans and Trigger Mechanisms			
13.1	Contingency plans relating to groundwater impacts and the triggering of these contingency plans shall be described as in Item 2 and 4 of Sch. "A".		Ongoing	YES
13.2	Contingency plans relating to surface water impacts and the triggering of these contingency plans shall be described as in Item 3 of Sch. "A".		Ongoing	YES
13.3	Contingency plans relating to landfill gas impacts and the triggering of these contingency plans shall be described as in Item 2 and 14 of Sch. "A".		Ongoing	YES
13.4	Any changes to the specific trigger levels for the groundwater and surface water monitoring programs shall be done in consultation with the CLC and the City prior to being submitted to the Director for approval.		Ongoing	YES
13.5	In the event of an off-site exceedance of the PWQO, ODWO or the Reasonable Use Guideline that has occurred as a result of Site operations, the Owner shall notify the Director, the CLC and the City. (See Amended ECA for specifications).		Ongoing	YES
14.0	Reporting			
14.1	By June 30 th of each year, an annual report on the use, operation, and monitoring for the previous year at the Site shall be submitted to the District Manager.	This report satisfies 14.1.	June 30 th , annually	YES

**Environmental Assessment Conditions Status Summary
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ECA A181008			Timing	
Condition Section	Description	Comments	Date Required	Compliance Status
15.0	Site Closure			
15.1	At least two years prior to closure or when 90% capacity is reached, the Owner shall submit a detailed Site closure plan pertaining to the termination of landfilling operations at the Site, post-closure inspection, maintenance and monitoring and end use.	Current Site life calculations show the Site will reach capacity in or around 2034.	Two years prior to closure	YES
15.2	The Closure Plan shall be designed in consultation with the CLC, the City and the Hamilton Region Conservation Authority prior to being submitted to the Director for approval.	Current Site life calculations show the Site will reach capacity in or around 2034.	Two years prior to closure	YES
15.3	The Site shall be closed in accordance with the closure plan as approved by the Director.		N/A	YES

Table 2.2

Summary of Complaints
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario

#	Date	Time	Nature of Complaint	Confirmation of Complaint	Resolution
1-21	20-Apr-21	9:00 a.m.	Site staff received notification of an odour complaint from the MECP on April 20, 2021. The complaint originated from April 13, 2021.	Site staff received the notification 7 days after the odour was detected. During our investigation, we spoke with all Operations Staff and Environmental Technicians working on and around the location on April 13th and no odours were detected. The facilities weather station records from April 13th indicates wind speeds being moderate and the direction predominantly travelling SW to NE. The data suggests the wind direction was travelling from the complainant's general location (SW of the facility towards the north. Therefore, it is highly unlikely the facility was the source of the odour.	Due to time the complaint was received and the findings from our investigation, no further follow-up action is required at this time.
2-21	1-Sep-21	9:50 a.m.	A fire truck showed up on site at 9:50 a.m. in response to a "gas leak" odour reported by some local residents.	Just prior to the complaint, odours were detected by site staff. Shortly after, the local Fire Dept. arrived on site responding to a "gas leak" and was immediately escorted to the active construction area. The Firemen investigated the area and were satisfied there was no "gas leak" and it was simply excavation work for re-location of material.	Construction activities were shutdown immediately and the frequency of all odour inspections were increased.
3-21	2-Sep-21	11:00 a.m.	The Hamilton Fire Department showed up at the site office at 11:00 a.m. in response to a "gas leak" odour reported by local residents.	The SCRF Regional Manager spoke with the Acting Captain and explained what is taking place on site with construction and the type of material being excavated. The Acting Captain confirmed this is not a problem but a temporary nuisance that is not harmful to the community.	The Regional Manager contacted the Site's MECP Officer to explain what has happened and let the local Fire Department know construction activities will continue at the site in case they receive further calls from the neighbours.
4-21	7-Sep-21	8:50 a.m.	A call was received at the SCRF at 8:50 am regarding concerns about the odours the complainant could smell. At 1:33 pm the SCRF Regional Manager received a call from the MECP regarding the same complaint.	The SCRF Regional Manager spoke to the complainant explaining the odour is from construction taking place at the site. He was told about the mailer that is being sent out to the surrounding community explaining what is taking place at the site and that they may detect odours from construction. The complainant was satisfied with the explanation regarding the nature of the odours.	A mailer notification is being sent to the surrounding community this week.

Summary of Complaints
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Stoney Creek, Ontario

#	Date	Time	Nature of Complaint	Confirmation of Complaint	Resolution
05-21	28-Sep-21	3:56 p.m.	Site staff received notification of an odour complaint from the MECP on Sept. 28, 2021 from a resident whose home backs onto Mud Street. The resident stated that she noticed chemical like odours coming from the facility around 9:15 p.m. last night (September 27), and around 10 a.m. this morning (September 28).	Facility operations stopped by 4 pm yesterday (Sept. 27th). Construction operations did not occur due to wet conditions. In regards to this morning (Sept 28th), construction operations did resume. Data collected from our weather station, the winds on the evening of Sept. 27th were calm coming from the North. On the morning of Sept. 28th the winds were calm coming from the Northeast. Our investigation has found that the potential source of the odour is coming from rainwater that has accumulate in the tipping area over the past few weeks. Data from our weather station recorded over 200 mm of rain during this time.	We are actively managing the accumulated water in order to mitigate any potential odours.
06-21	1-Nov-21	8:54 a.m.	Site staff received notification from the local Councilor of an odour complaint on November 1st that originated on October 29, 2021.	Site staff received the notification 3 days after the odour was detected. During our investigation, the facilities weather station records from October 29th indicates wind speeds being moderate to strong and the direction predominantly travelling NE to SW. The data suggests the wind direction was travelling towards the complainant's general location (SW of the facility. Operational records indicate construction activities and the re-location of waste occurred throughout the day.	Due to the time the complaint was received the source of the odour could not be clearly identified, therefore no further follow-up action is required at this time.
07-21	26-Nov-21	4:22 p.m.	The local resident stated they smell odours from time to time (a few times per year), but they were particularly bad on Nov. 24th around 8:30 am.	Site staff received the notification 2 days after the odour was detected. We reviewed the data from the onsite weather station which shows winds were calm and travelling in a south to north direction. The complainant's approximate location is northwest of the facility and quite a distance from the site. With the information provided, our review of the weather station data and investigation findings, it is highly unlikely that the source of the odour was generated from the facility	Due to time the complaint was received and the findings from our investigation, no further follow-up action is required at this time.
Complaint Summary: Odour - 7 Dust - Noise - 0 Drag Out - 0 Vehicle Related - 0 Other - 0					

**Resistivity Survey Results
2021 Annual Operations and Monitoring Report
GFL Environmental Operating Stoney Creek Regional Facility**

Electrode Array	Station	Date	Cycles	Applied Current (I)	Measured Voltage (V)	Apparent Resistivity (Ro)	Quality (Q)	Self Potential (SP)
B1 (1,2,3,4)	PH2-1	23-Mar-21	500	196.20	3320.49	10.63	0.03	355.3
B1 (1,2,3,4)	PH2-1	15-Jun-21	500			Unable to get readings		
B1 (1,2,3,4)	PH2-1	15-Sep-21	500	126.39	2076.45	10.32	0.20	363.1
B1 (1,2,3,4)	PH2-1	16-Dec-21	500	775.79	12355.70	10.01	0.26	283.5
B2 (5,6,7,8)	PH2-2	23-Mar-21	500			Unable to get readings		
B2 (5,6,7,8)	PH2-2	15-Jun-21	500	768.15	10766.60	8.81	0.48	-127.20
B2 (5,6,7,8)	PH2-2	15-Sep-21	500			Unable to get readings		
B2 (5,6,7,8)	PH2-2	16-Dec-21	500			Unable to get readings		
B3 (9,10,11,12)	PH2-3	23-Mar-21	500			Unable to get readings		
B3 (9,10,11,12)	PH2-3	15-Jun-21	500			Unable to get readings		
B3 (9,10,11,12)	PH2-3	15-Sep-21	500			Unable to get readings		
B3 (9,10,11,12)	PH2-3	16-Dec-21	500			Unable to get readings		
B4 (13,14,15,16)	PH2-4	23-Mar-21	500	245.76	3837.77	9.81	0.28	333.6
B4 (13,14,15,16)	PH2-4	15-Jun-21	500	767.81	12157.10	9.95	0.6	-507.3
B4 (13,14,15,16)	PH2-4	15-Sep-21	500	129.76	1946.37	9.42	0.17	-255.9
B4 (13,14,15,16)	PH2-4	16-Dec-21	500	787.39	11578.10	9.24	0.67	-520.3
B5 (17,18,19,20)	PH2-5	23-Mar-21	500	198.57	3442.20	10.89	2.08	2.3
B5 (17,18,19,20)	PH2-5	15-Jun-21	500	753.27	13158.90	10.98	0.2	-120.5
B5 (17,18,19,20)	PH2-5	15-Sep-21	500	130.72	2126.23	10.22	0.18	-14.4
B5 (17,18,19,20)	PH2-5	16-Dec-21	500	778.30	12537.20	10.12	0.49	-125.0
B6 (21,22,23,24)	PH2-6	23-Mar-21	500	197.93	3289.43	10.44	0.40	333.9
B6 (21,22,23,24)	PH2-6	15-Jun-21	500	768.32	12804.20	10.47	0.61	132
B6 (21,22,23,24)	PH2-6	15-Sep-21	500	136.85	2137.78	9.82	0.40	305.4
B6 (21,22,23,24)	PH2-6	16-Dec-21	500	792.69	12192.70	9.66	0.71	80.0
T1 (1,2,3,4)	PH2-7	23-Mar-21	500	147.84	319.40	13.57	0.15	8
T1 (1,2,3,4)	PH2-7	15-Jun-21	500	629.77	-13043.10	-13.01	0.69	59.3
T1 (1,2,3,4)	PH2-7	15-Sep-21	500	82.35	1510.61	11.53	0.31	4.5
T1 (1,2,3,4)	PH2-7	16-Dec-21	500	658.49	12530.60	11.96	0.66	62.1
T2 (5,6,7,8)	PH2-8	23-Mar-21	500	145.58	3317.98	14.32	0.07	59
T2 (5,6,7,8)	PH2-8	15-Jun-21	500	674.53	14479.80	13.49	3.07	128.9
T2 (5,6,7,8)	PH2-8	15-Sep-21	500	97.46	1863.96	12.02	0.20	22.2
T2 (5,6,7,8)	PH2-8	16-Dec-21	500	701.20	14044.00	12.59	0.49	169.8
T3 (9,10,11,12)	PH2-9	23-Mar-21	500	169.01	3247.17	12.07	0.17	84.7
T3 (9,10,11,12)	PH2-9	15-Jun-21	500	662.65	11899.40	11.28	0.04	-42.1
T3 (9,10,11,12)	PH2-9	15-Sep-21	500	99.68	1565.08	9.86	0.44	52.3
T3 (9,10,11,12)	PH2-9	16-Dec-21	500	672.73	5485.57	5.12	0.52	-189.1
T4 (13,14,15,16)	PH2-10	23-Mar-21	500	145.00	3099.10	13.43	0.13	-146.8
T4 (13,14,15,16)	PH2-10	15-Jun-20	500	675.73	13337.00	12.40	0.96	-506.9
T4 (13,14,15,16)	PH2-10	15-Sep-21	500	100.37	1732.09	10.84	0.36	-49.1
T4 (13,14,15,16)	PH2-10	16-Dec-21	500	713.77	13244.30	11.66	0.87	-434.6
T5 (17,18,19,20)	PH2-11	23-Mar-21	500	135.01	3246.84	15.11	0.22	20.7
T5 (17,18,19,20)	PH2-11	15-Jun-21	500	658.41	14330.90	13.68	1.26	-17
T5 (17,18,19,20)	PH2-11	15-Sep-21	500	98.71	1865.09	11.87	0.13	286.2
T5 (17,18,19,20)	PH2-11	16-Dec-21	500	669.36	13906.90	13.05	0.13	-42.4
T6 (21,22,23,24)	PH2-12	23-Mar-21	500	161.68	3191.56	12.40	0.35	153.9
T6 (21,22,23,24)	PH2-12	15-Jun-21	500	694.66	12385.70	11.20	1.28	137.1
T6 (21,22,23,24)	PH2-12	15-Sep-21	500	101.49	1550.30	9.60	0.42	161.1
T6 (21,22,23,24)	PH2-12	16-Dec-21	500	669.43	11469.90	10.77	1.56	274.0

Table 3.4

**Summary of Waste Rejection
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility**

Report	Date	Source	Description
LF#1-21	5-Jan-21	Asbestos Waste	A load of asbestos was brought into the facility and upon inspection, it was found the load was not contained properly. This load was not received and was rejected back to the generator.
LF#2-21	26-Jan-21	Contaminated Sand	Environmental staff was supplied with waste information to review for waste acceptance. The concentration of Lead exceeded our acceptance criteria and the MECP schedule 4 limits. An approval was not issued.
LF#3-21	4-May-21	Asbestos Waste	A load of asbestos was brought into the facility and upon inspection, it was found the load was not contained properly. Also the proper shipping documents were not completed. This load was not received and was rejected back to the generator.
LF#4-21	11-May-21	Contaminated Sand	A load of material arrived at the scalehouse for approval paperwork verification. The paperwork did not match up with any current approval and the load was rejected back to the
LF#5-21	11-May-21	Mixed Waste	A load of material arrived at the scalehouse for approval paperwork verification. The paperwork did not match up with any current approval and the load was rejected back to the
LF#6-21	28-Jun-21	Consolidated Material	A customer called the main office asking about disposal of bags of salt. This is not an acceptable material for SCRF and was rejected.
LF#7-21	28-Jun-21	Mixed Waste	Environmental staff was supplied with waste information to review for disposal of mixed waste from a marijuana grow operation consisting of Putrescible Waste. This is note an acceptable material for SCRF and was rejected.
LF#8-21	29-Jun-21	Mixed Waste	Environmental staff was supplied with waste information to review for waste acceptance. The waste contained unacceptable materials and an approval was not issued.
LF#9-21	13-Jul-21	Mixed Waste	Environmental staff was supplied with waste information to review for waste acceptance. The material consisted of unapproved waste and an approval was not issued.
LF#10-21	15-Jul-21	Mixed Waste	Environmental staff was supplied with waste information to review for waste acceptance. The material under review contained leachate bed material from an old septic bed. The facilities ECA does not permit us to receive this type of waste and an approval was not issued.
LF#11-21	11-Aug-21	Mixed Waste	Environmental staff was supplied with waste information to review for waste acceptance. The material contained mixed was of unacceptable waste such as, pentachlorophenol poles penta PCP, arsenic, metal fasteners and ceramic insulators. This is not acceptable material for SCRF and an approval was not issued.
LF#12-21	31-Aug-21	Mixed Waste	Environmental staff was supplied with waste information to review for waste acceptance. The material consisted of physical states consisting of mixed waste and fertilizers not acceptable for receipt at the SCRF. An approval was not issued.
LF#13-21	22-Oct-21	Contaminated Soil	Environmental staff was supplied with waste information to review for waste acceptance. The concentration of Arsenic exceeded our acceptance criteria and the MECP schedule 4 limits. An approval was not issued.
LF#14-21	11-Nov-21	Contaminated Soil	Environmental staff was supplied with waste information to review for waste acceptance. The concentration of Arsenic exceeded our acceptance criteria and the MECP schedule 4 limits. An approval was not issued.
LF#15-21	16-Dec-21	Baghouse Dust	Environmental staff was supplied with waste information to review for waste acceptance for disposal of Carbon Black. The waste is too dusty to receive and an approval was not issued.

**Landfill Gas Monitoring Results
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario**

Date	Monitor									
	GE1	GE2	GE3	GE4	GE5	GE6	GE7	GE8	GE9	GE10
20-Jan-21	0.0	0.0	0.0	0.0	0.0	n/m	0.0	0.0	0.0	0.0
25-Feb-21	0.0	0.0	0.0	0.0	0.0	n/m	0.0	0.0	0.3	0.0
25-Mar-21	0.0	0.0	0.0	0.0	0.0	n/m	0.0	0.0	0.0	0.0
30-Jun-21	0.0	0.0	0.0	0.0	0.0	n/m	0.0	0.0	0.0	0.0
20-Oct-21	0.0	0.0	0.0	0.0	0.0	n/m	0.0	0.0	0.0	0.0
9-Nov-21	0.0	0.0	0.0	0.0	0.0	n/m	0.0	0.0	0.0	0.0
9-Dec-21	0.0	0.0	0.0	0.0	0.0	n/m	0.0	0.0	0.0	0.0

Notes:

All measurements present gas monitoring results in LEL (lower explosive limit of CH₄ [by %])

n/m No measurement

n/r No measurement required at this time

Dirt has washed off of berm and covered well GE6

**2021 Groundwater Monitoring Program
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario**

Monitoring Well Nest	Waste	Eramosa	VFZ	UFZ	UMFZ	LMFZ	LFZ	RS
			Monitor Flow Zone Designation – e.g. 29-II = VFZ monitor					
14			II	III	I		I	
29*						IV		
30	II		III	I				
31	II		I					
32	II		I					
33	II ¹							
35		V ¹	VII ¹	IV ¹	VI ¹		III ¹	
36R		IVR ⁴	VR ⁴	IIIR ⁴	IR ⁴		IIIR ⁴	
40*			III	IIIR ⁴	I			
41	OB III ³				II ¹		I ¹	
42			III	II		I		
43						II	I	
44						II ¹	I ¹	
45						II	I	
46R				IIIR ⁴	IIIR ⁴		IR ⁴	
47		IV ¹	III ¹	IIIR ¹	I ¹			
48		IV	V	III	II			
49		IV	V	III	II		IR ⁴	
50		II		I				
51		V ¹	IV ¹					VI
52		III	II	I				
55								
56				II	I			
57	II ¹			IR ¹				
58	I ¹							
60			III	II	I		IV	
61			III	II	I			
62				IV	III	II	I	
67				III	II	I		
68			IV ¹	III ¹	II ¹		I ¹	
72				III ¹	II ¹		I ¹	
75				IV	III	II	I	
76					III ¹	II ¹		I ¹
77		III				II	I	
G1, G12, G14, G2, G23, G25, G26, G28, G3, G35		G1, G12, G14, G2, G23, G25, G26, G28, G3, G35						
G11, G13, G24, G27		G11, G13, G24, G27						
P1				III		II	I	
P2						II	I	
P3				II	III	I		
P4		IV		II	III		I	
P5R			IVR ⁴	IIIR ⁴	IIIR ⁴		IR ⁴	
P6,9			9-I	P6-IR ⁴				
P7		VIR ⁴	IV	III	II		IR ⁴	
P8		II		I				
P9		II	IIIR ⁴	I				
P10		V ¹	IV ¹	III ¹	II ¹		I ¹	
P11				III	II		I	
P12				I				
P13				I				
P14				I				
P15				I				
P16				I				
P17				I				
North Sump			Sump					
GW-PS (S. Sump)			Sump					
Shatter Trench				ST 1				
Shatter Trench					ST 1-I			

**2021 Groundwater Monitoring Program
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario**

Monitoring Well Nest	Waste	Eramosa	VFZ	UFZ	UMFZ	LMFZ	LFZ	RS
Shatter Trench				ST 2				
Shatter Trench				ST 2-I				
Shatter Trench				ST1-II				
Shatter Trench					ST 2-II			
Shatter Trench					M 5			
Shatter Trench					M 5R			
Shatter Trench				M 5a				
Lower Excavation					M4			
Lower Excavation				M1				
CW3				CW3				
CW16				CW16				
CW5R				CW5R				
L1							L1	
Perimeter Drain				PD ¹	PD			
Groundwater Seeps	A2, A4, A5							
LS1, LS2, LS3	LS1, LS2, LS3							

NOTES

- VFZ Vinemount Flow Zone
- UFZ Upper Flow Zone
- UMFZ Upper-Mid Flow Zone
- LMFZ Lower-Mid Flow Zone
- LFZ Lower Flow Zone
- RS Rochester Shale
- 1) Misa Organic Group Analysis conducted in 2017 to collect baseline data
- * Monitors will be decommissioned when liner construction reaches this location
- 3) OB III, OB VI are overburden monitors and are not in waste
- 4) Monitor has been replaced by a new installation in close proximity to the original location
- III Closed GFL Environmental Closed Stoney Creek Regional Facility
- III Operating GFL Environmental Closed Stoney Creek Regional Facility
- M 5 Water Level Measurements Only
- ST 2 Permit To Take Water Monitors (monthly basis)
- M 5a Permit To Take Water Monitors (weekly basis)

FREQUENCY AND PARAMETERS

Seep Monitoring – Closed LF requirement	Frequency – Twice per year – Sample parameters are – field Conductivity, pH, temperature and dissolved oxygen. Also include general chemistry for the surface water-monitoring program.
Private Well Monitoring – PTTW requirement	Residence 1, Residence 2, – Quarterly water quality sampling for List A (with owner's permission)
Parameter List A and B Frequency – A - Each Quarter, B - Biannual	List A - pH, Cond., Alk., Hard., TDS, Phenols, TKN, NH ₃ -N, Ca, K, Mg, Na, Cl, F, Br, NO ₂ -N, NO ₃ -N, PO ₄ , SO ₄ , Al, Ba, Be, B, Cd, Cr, Co, Cu, Pb, Fe, Mn, Mo, Ni, Si, Sr, Ti, V, Zn, DOC, Field pH, Field Cond., and Water Temp Locations with ¹ - List B - Misa Groups 16,17,18,19,20 and 22
Air Injection System Monitoring – Closed LF requirement	Reported by COMCOR under separate cover
Gas Monitoring - Active LF requirement	Reported in the Annual Report for the GFL Environmental Operating Stoney Creek Regional Facility

Table 4.5

**Groundwater Monitoring Program Deviations
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario**

Monitor	Screened Unit	Trigger Monitoring Well	Reason
January 2021			
30-I	UFZ		No volume
32-I	VFZ		Detached
42-I	LMFZ		No sample
50-II	Eramosa		No access due to construction excavation
52-II	VFZ		Could not obtain sample, frozen
56-II	UFZ	Y	No volume
72-I	LFZ		No access due to construction excavation
72-II	UMFZ		No access due to construction excavation
72-III	UFZ		No access due to construction excavation
77-I	LFZ		No access due to construction excavation
77-II	UMFZ/LMFZ		No access due to construction excavation
77-III	Eramosa		No access due to construction excavation
P2-II	UMFZ/LMFZ		No volume
P3-I	UMFZ/LMFZ		No volume
CW3	UFZ		Well off
M5A	UFZ		Well off
M5R	UMFZ		Well off
GW-PS	VFZ		Well off
PD	UFZ/UMFZ		Well off
April 2021			
31-II	Waste		No volume
32-II	Waste		No volume for BOD
42-I	LMFZ		No volume
50-II	Eramosa		No access due to construction excavation
52-III	Eramosa		No volume for field chemistry. Sample obtained
P2-I	LFZ		No volume
P2-II	UMFZ/LMFZ		No volume
P3-I	UMFZ/LMFZ		No volume
LS1	Waste		No volume for organics
LS2	Waste		No volume for organics
LS3	Waste		No volume for organics
M5A	UFZ		Well off
GW-PS	VFZ		Well off
PD	UFZ/UMFZ		Well off
July 2021			
32-II	Waste		No volume
42-I	LMFZ		No volume
52-I	UFZ		No volume
56-II	UFZ	Y	No volume
75-IV	UFZ		No volume
P2-I	LFZ		No volume
P2-II	UMFZ/LMFZ		No volume
P3-I	UMFZ/LMFZ		No volume
P4-IV	Eramosa		No volume
LS1	Waste		No volume for sample
LS2	Waste		No volume for sample
LS3	Waste		No volume for sample
M5A	UFZ		Well off
GW-PS	VFZ		Well off
PD	UFZ/UMFZ		Well off
October 2021			
50-II	Eramosa		No access due to construction
56-II	UFZ	Y	No volume
P2-II	UMFZ/LMFZ		No volume
LS1	Waste		No volume for sample
LS2	Waste		No volume for sample
LS3	Waste		No volume for sample
M5A	UFZ		Well off
GW-PS	VFZ		Well off
PD	UFZ/UMFZ		Well off

Table 4.7.1A

**RUC Trigger Level Assessment
Shallow (Eramosa) Flow Zone
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario**

Parameter (mg/L) Triggers	Barium (dissolved)	Boron (dissolved)	Cadmium (dissolved)	Chromium (dissolved)	Copper (dissolved)	Iron (dissolved)	Lead (dissolved)	Manganese (dissolved)	Sodium (dissolved)	Zinc (dissolved)
ID	0.289	1.34	0.00132	0.01625	0.50045	0.650	0.00288	0.110	295	2.51
35-V 1/25/2021	0.034	0.064	0.00021	ND (0.005)	0.0036	ND (0.1)	ND (0.0005)	ND (0.002)	30	0.63
35-V 4/16/2021	0.027	0.061	0.00019	ND (0.005)	0.0031	ND (0.1)	ND (0.0005)	0.008	26	0.67
35-V 7/26/2021	0.08	0.077	0.00037	ND (0.005)	0.0019	ND (0.1)	ND (0.0005)	0.064	240	0.72
35-V 10/25/2021	0.04	0.081	0.00025	ND (0.005)	0.0049	ND (0.1)	ND (0.0005)	0.006	21	0.48
36-IVR 1/26/2021	0.020	0.069	0.00013	ND (0.005)	0.0026	0.37	0.0056	0.044	70	0.21
36-IVR 4/20/2021	0.013	0.035	ND (0.00009)	ND (0.005)	0.0011	ND (0.1)	ND (0.0005)	0.003	38	0.13
36-IVR 7/27/2021	0.015	0.093	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.035	140	0.06
36-IVR 10/27/2021	0.033	0.050	ND (0.00009)	ND (0.005)	0.0051	ND (0.1)	ND (0.0005)	0.005	62	0.15
41-III 1/28/2021	0.033	0.110	0.00012	ND (0.005)	0.0017	ND (0.1)	ND (0.0005)	ND (0.002)	46	ND (0.005)
41-III 4/20/2021	0.035	0.120	ND (0.00009)	ND (0.005)	0.0014	ND (0.1)	ND (0.0005)	0.008	39	ND (0.005)
41-III 7/27/2021	0.054	0.110	ND (0.00009)	ND (0.005)	ND (0.0009)	0.79	ND (0.0005)	0.054	50	ND (0.005)
41-III 7/27/2021	0.036	0.110	0.00012	ND (0.005)	ND (0.0009)	0.12	ND (0.0005)	0.043	48	ND (0.005)
41-III 10/27/2021	0.035	0.190	0.00019	ND (0.005)	0.0019	ND (0.1)	ND (0.0005)	0.040	56	ND (0.005)
G13 2/2/2021	0.030	0.270	0.00038	ND (0.005)	0.0032	ND (0.1)	ND (0.0005)	ND (0.002)	210	0.57
G13 4/20/2021	0.029	0.270	0.00036	ND (0.005)	0.0031	ND (0.1)	0.00071	0.011	180	0.67
G13 7/30/2021	0.033	0.280	0.00040	ND (0.005)	0.0034	ND (0.1)	ND (0.0005)	0.007	220	0.56
G13 11/5/2021	0.019	0.390	0.00039	ND (0.005)	0.0057	ND (0.1)	ND (0.0005)	0.006	100	0.7
G24 1/25/2021	0.050	0.230	0.00070	ND (0.005)	0.0039	ND (0.1)	ND (0.0005)	0.020	23	1.80
G24 4/14/2021	0.032	0.130	0.00050	ND (0.005)	0.0026	ND (0.1)	0.00071	0.010	18	1.50
G24 7/26/2021	0.058	0.130	0.00010	ND (0.005)	ND (0.0009)	0.27	ND (0.0005)	0.073	46	0.95
G24 10/25/2021	0.047	0.220	0.00010	ND (0.005)	0.0050	ND (0.1)	ND (0.0005)	0.010	18	1.60
P9-II 1/26/2021	0.032	0.097	ND (0.00045)	ND (0.025)	ND (0.0045)	ND (0.5)	ND (0.0025)	0.010	250	ND (0.025)
P9-II 4/14/2021	0.026	0.092	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.016	220	ND (0.005)
P9-II 7/27/2021	0.027	0.200	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.008	230	ND (0.005)
P9-II 7/27/2021	0.027	0.170	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.008	230	ND (0.005)
P9-II 10/25/2021	0.026	0.160	ND (0.00009)	ND (0.005)	0.0011	ND (0.1)	ND (0.0005)	0.071	88	0.007
P10-V 2/2/2021	0.040	0.180	0.0016	ND (0.005)	0.0051	ND (0.1)	0.00088	0.006	35	0.86
P10-V 4/26/2021	0.035	0.079	0.0011	ND (0.005)	0.0047	ND (0.1)	0.00560	0.009	23	0.53
P10-V 8/3/2021	0.055	0.210	0.0029	ND (0.005)	0.0045	ND (0.1)	0.00150	0.004	56	0.76
P10-V 11/5/2021	0.043	0.170	0.0009	ND (0.005)	0.0059	ND (0.1)	0.00200	0.011	20	0.34

Notes:

All units are in mg/L

Metals parameters are dissolved concentrations

Trigger concentrations have been calculated using median 2020-2021 concentrations from background well nest 77 with the RUC Guideline B-7 MABC guidance

0.45

Table 4.7.1A

**RUC Trigger Level Assessment
Shallow (Eramosa) Flow Zone
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario**

Parameter (mg/L)	Chloride (dissolved)	Fluoride	Nitrate (as N)	Nitrite (as N)	Sulfate (dissolved)
ID	455	0.98	2.71	0.277	695
Triggers Date					
35-V 1/25/2021	1100	0.62	0.33	ND (0.010)	180
35-V 4/16/2021	1000	0.70	0.79	ND (0.010)	140
35-V 7/26/2021	2800	0.94	ND (0.10)	ND (0.010)	630
35-V 10/25/2021	800	0.64	0.66	ND (0.010)	99
36-IVR 1/26/2021	1700	1.30	0.24	ND (0.010)	620
36-IVR 4/20/2021	1400	1.30	0.11	ND (0.010)	360
36-IVR 7/27/2021	2100	1.40	ND (0.10)	ND (0.010)	550
36-IVR 10/27/2021	1400	0.99	0.3	ND (0.010)	320
41-III 1/28/2021	1300	0.34	ND (0.10)	ND (0.010)	160
41-III 4/20/2021	1100	0.39	ND (0.10)	ND (0.010)	110
41-III 7/27/2021	1300	0.29	ND (0.10)	ND (0.010)	150
41-III 7/27/2021	1300	0.31	ND (0.10)	ND (0.010)	150
41-III 10/27/2021	1400	0.33	ND (0.10)	ND (0.010)	140
G13 2/2/2021	2300	0.91	3.87	ND (0.010)	330
G13 4/20/2021	2100	0.99	2.99	0.031	350
G13 7/30/2021	2100	1.20	0.96	0.028	290
G13 11/5/2021	1400	1.10	4.99	0.018	190
G24 1/25/2021	1500	1.20	0.27	ND (0.010)	610
G24 4/14/2021	1000	0.88	0.50	ND (0.010)	250
G24 7/26/2021	1400	0.81	ND (0.10)	ND (0.010)	380
G24 10/25/2021	980	1.10	0.26	ND (0.010)	310
P9-II 1/26/2021	2400	0.83	1.38	ND (0.010)	510
P9-II 4/14/2021	2500	0.80	0.78	ND (0.010)	540
P9-II 7/27/2021	2300	0.95	0.40	ND (0.010)	420
P9-II 7/27/2021	2300	1.00	0.40	ND (0.010)	430
P9-II 10/25/2021	1100	0.96	0.68	ND (0.010)	330
P10-V 2/2/2021	980	0.79	0.34	ND (0.010)	140
P10-V 4/26/2021	930	0.50	0.31	ND (0.010)	110
P10-V 8/3/2021	1200	0.60	ND (0.10)	ND (0.010)	200
P10-V 11/5/2021	810	0.84	ND (0.10)	ND (0.010)	58

Notes:

All units are in mg/L

Metals parameters are dissolved concentrations

Trigger concentrations have been calculated using median 2020-2021 concentrations from background well nest 77 with the RUC Guideline B-7 MABC guidance

0.45

Table 4.7.1B

**RUC Trigger Level Assessment
Vinemount Flow Zone
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario**

Parameter (mg/L) Triggers	Barium (dissolved)	Boron (dissolved)	Cadmium (dissolved)	Chromium (dissolved)	Copper (dissolved)	Iron (dissolved)	Lead (dissolved)	Manganese (dissolved)	Sodium (dissolved)	Zinc (dissolved)
	0.289	1.34	0.00132	0.01625	0.50045	0.650	0.00288	0.110	295	2.51
ID	Date									
47-III	1/29/2021	0.014	1.5	ND (0.00045)	ND (0.025)	ND (0.0045)	ND (0.5)	0.059	120	ND (0.025)
47-III	4/21/2021	0.021	1.3	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	0.064	160	ND (0.005)
47-III	8/3/2021	0.011	1.4	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	0.053	94	ND (0.005)
47-III	8/3/2021	0.012	1.4	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	0.052	94	ND (0.005)
47-III	10/29/2021	0.014	1.2	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	0.055	120	ND (0.005)
48-V	1/29/2021	0.013	1.4	ND (0.00045)	ND (0.025)	ND (0.0045)	ND (0.5)	0.090	670	ND (0.025)
48-V	1/29/2021	0.035	0.9	ND (0.00045)	ND (0.025)	ND (0.0045)	0.69	0.150	330	ND (0.025)
48-V	4/21/2021	0.034	1.2	ND (0.00009)	ND (0.005)	ND (0.0009)	0.55	0.150	370	ND (0.005)
48-V	8/3/2021	0.036	1.2	ND (0.00009)	ND (0.005)	ND (0.0009)	0.80	0.160	420	ND (0.005)
48-V	8/3/2021	0.036	0.9	ND (0.00009)	ND (0.005)	ND (0.0009)	0.87	0.160	440	ND (0.005)
48-V	10/29/2021	0.03	1.4	ND (0.00009)	ND (0.005)	ND (0.0009)	0.50	0.130	280	ND (0.005)
60-III	1/29/2021	0.012	2.1	ND (0.00045)	ND (0.025)	ND (0.0045)	ND (0.5)	0.091	620	ND (0.025)
60-III	1/29/2021	0.039	0.7	ND (0.00009)	ND (0.005)	0.00099	ND (0.1)	0.087	230	0.04
60-III	4/21/2021	0.042	0.8	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	0.100	270	0.04
60-III	7/30/2021	0.035	0.7	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	0.085	250	0.03
60-III	10/29/2021	0.036	0.7	ND (0.00009)	ND (0.005)	0.0011	ND (0.1)	0.069	210	0.04
61-III	1/28/2021	0.021	2.1	ND (0.00045)	ND (0.025)	ND (0.0045)	ND (0.5)	0.072	280	ND (0.025)
61-III	4/21/2021	0.021	2.4	ND (0.00009)	ND (0.005)	ND (0.0009)	0.19	0.072	330	ND (0.005)
61-III	4/23/2021	0.014	2.7	ND (0.00009)	ND (0.005)	0.0015	0.35	0.093	390	ND (0.005)
61-III	7/30/2021	0.021	1.9	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	0.055	250	ND (0.005)
61-III	10/29/2021	0.017	2.1	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	0.065	280	ND (0.005)
68-IV	1/25/2021	0.069	0.2	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	0.005	66	ND (0.005)
68-IV	4/20/2021	0.052	0.2	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.005)	50	ND (0.005)
68-IV	7/26/2021	0.068	0.4	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	0.011	52	ND (0.005)
68-IV	10/26/2021	0.066	0.5	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	0.004	54	ND (0.005)

Notes:

All units are in mg/L

Metals parameters are dissolved concentrations

Trigger concentrations have been calculated using median 2020-2021 concentrations from background well nest 77 with the RUC Guideline B-7 MABC guidance

0.45	Concentration above its respective Trigger level
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Table 4.7.1B
RUC Trigger Level Assessment
Vinemount Flow Zone
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario

Parameter (mg/L) Triggers	Chloride (dissolved)	Fluoride	Nitrate (as N)	Nitrite (as N)	Sulfate (dissolved)	
	455	0.98	2.71	0.28	695	
ID	Date					
47-III	1/29/2021	190	0.67	ND (0.10)	ND (0.010)	860
47-III	4/21/2021	430	0.61	ND (0.10)	ND (0.010)	860
47-III	8/3/2021	110	0.63	ND (0.10)	ND (0.010)	720
47-III	8/3/2021	110	0.58	ND (0.10)	ND (0.010)	690
47-III	10/29/2021	190	0.74	ND (0.10)	ND (0.010)	610
48-V	1/29/2021	1300	0.96	ND (0.10)	ND (0.010)	1700
48-V	1/29/2021	540	0.72	ND (0.10)	ND (0.010)	1300
48-V	4/21/2021	580	0.75	ND (0.10)	ND (0.010)	1500
48-V	8/3/2021	700	0.74	ND (0.10)	ND (0.010)	1300
48-V	8/3/2021	720	0.63	ND (0.10)	ND (0.010)	1400
48-V	10/29/2021	400	0.84	ND (0.10)	ND (0.010)	1400
60-III	1/29/2021	1500	0.79	ND (0.10)	ND (0.010)	1600
60-III	1/29/2021	210	0.70	1.12	0.06	850
60-III	4/21/2021	400	0.63	0.56	0.03	930
60-III	7/30/2021	250	0.69	ND (0.10)	0.02	720
60-III	10/29/2021	250	0.73	1.68	0.07	720
61-III	1/28/2021	700	0.73	0.22	ND (0.010)	1400
61-III	4/21/2021	800	0.77	ND (0.10)	ND (0.010)	1500
61-III	4/23/2021	390	0.85	ND (0.10)	ND (0.010)	1500
61-III	7/30/2021	450	0.72	0.55	ND (0.010)	1200
61-III	10/29/2021	530	0.64	ND (0.10)	ND (0.010)	1600
68-IV	1/25/2021	140	0.59	0.22	ND (0.010)	74
68-IV	4/20/2021	72	0.72	0.11	ND (0.010)	68
68-IV	7/26/2021	130	0.84	0.44	ND (0.010)	88
68-IV	10/26/2021	94	0.78	0.29	ND (0.010)	77

Notes:
 All units are in mg/L
 Metals parameters are dissolved concentrations
 Trigger concentrations have been calculated using median 2020-2021 concentrations from background well nest 77
 with the RUC Guideline B-7 MABC guidance
0.45 Concentration above its respective Trigger level

Table 4.7.1C

**RUC Trigger Level Assessment
Upper Flow Zone
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario**

Parameter (mg/L) Triggers	Barium (dissolved) 0.289	Boron (dissolved) 1.34	Cadmium (dissolved) 0.00132	Chromium (dissolved) 0.01625	Copper (dissolved) 0.5005	Iron (dissolved) 0.65	Lead (dissolved) 0.0029	Manganese (dissolved) 0.110	Sodium (dissolved) 295	Zinc (dissolved) 2.51	Chloride (dissolved) 455	
ID	Date											
47-IIR	1/29/2021	0.056	0.23	ND (0.00009)	ND (0.005)	ND (0.0009)	0.12	0.0008	0.140	81	0.18	84
47-IIR	1/29/2021	0.058	0.23	ND (0.00009)	ND (0.005)	ND (0.0009)	0.12	0.0009	0.140	82	0.18	86
47-IIR	4/21/2021	0.061	0.15	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	0.0013	0.095	130	0.22	240
47-IIR	8/3/2021	0.042	0.15	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.130	67	0.16	98
47-IIR	10/29/2021	0.034	0.19	ND (0.00009)	ND (0.005)	0.0011	ND (0.1)	0.0016	0.058	110	0.20	180
56-II	4/14/2021	0.031	0.19	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	0.0010	0.063	160	ND (0.005)	270
61-II	1/28/2021	0.014	2.60	ND (0.00045)	ND (0.025)	ND (0.0045)	ND (0.5)	ND (0.0025)	0.170	350	ND (0.025)	330
61-II	4/23/2021	0.013	2.80	ND (0.00009)	ND (0.005)	ND (0.0009)	0.11	ND (0.0005)	0.074	390	ND (0.005)	430
61-II	7/30/2021	0.014	3.00	ND (0.00009)	ND (0.005)	0.0012	0.47	ND (0.0005)	0.190	370	ND (0.005)	420
61-II	11/1/2021	0.015	4.60	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.068	400	ND (0.005)	400
61-II	11/1/2021	0.014	4.20	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.067	390	ND (0.005)	400

Notes:

All units are in mg/L

Metals parameters are dissolved concentrations

Trigger concentrations have been calculated using median 2020-2021 concentrations from background well nest 77 with the RUC Guideline B-7 MABC guidance

0.45 Concentration above its respective Trigger level

Table 4.7.1C
RUC Trigger Level Assessment
Upper Flow Zone
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario

Parameter (mg/L) Triggers	Fluoride	Nitrate (as N)	Nitrite (as N)	Sulfate (dissolved)	
	0.98	2.71	0.277	695	
ID	Date				
47-IIR	1/29/2021	0.60	ND (0.10)	ND (0.010)	480
47-IIR	1/29/2021	0.61	ND (0.10)	ND (0.010)	490
47-IIR	4/21/2021	0.56	ND (0.10)	ND (0.010)	340
47-IIR	8/3/2021	0.52	ND (0.10)	ND (0.010)	190
47-IIR	10/29/2021	0.69	0.17	ND (0.010)	410
56-II	4/14/2021	0.55	ND (0.10)	ND (0.010)	400
61-II	1/28/2021	0.94	ND (0.10)	ND (0.010)	1700
61-II	4/23/2021	0.89	ND (0.10)	ND (0.010)	1800
61-II	7/30/2021	1.00	ND (0.10)	ND (0.010)	1300
61-II	11/1/2021	1.00	ND (0.10)	ND (0.010)	1500
61-II	11/1/2021	1.00	ND (0.10)	ND (0.010)	1500

Notes:

All units are in mg/L

Metals parameters are dissolved concentrations

Trigger concentrations have been calculated using median 2020-2021 concentrations from background well nest 77 with the RUC Guideline B-7 MABC guidance

0.45 Concentration above its respective Trigger level

Table 4.7.1D

**RUC Trigger Level Assessment
Upper-Mid Flow Zone
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario**

	Parameter (mg/L) Triggers	Barium (dissolved) 0.355	Boron (dissolved) 5.83	Cadmium (dissolved) 0.005	Chromium (dissolved) 0.2	Copper (dissolved) 0.523	Iron (dissolved) 2.65	Lead (dissolved) 0.021	Manganese (dissolved) 0.725	Sodium (dissolved) 8600	Zinc (dissolved) 2.63	Chloride (dissolved) 30125
36-IR	1/26/2021	0.021	2.80	ND (0.00045)	ND (0.025)	ND (0.0045)	ND (0.5)	ND (0.0025)	0.064	650	ND (0.025)	1000
36-IR	4/20/2021	0.019	2.90	ND (0.00045)	ND (0.025)	ND (0.0045)	ND (0.5)	ND (0.0025)	0.059	650	ND (0.025)	1100
36-IR	7/27/2021	0.020	2.20	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.055	630	ND (0.005)	1200
36-IR	10/27/2021	0.020	2.70	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.063	690	ND (0.005)	1200
41-II	1/28/2021	0.037	0.13	ND (0.00009)	ND (0.005)	0.002	ND (0.1)	ND (0.0005)	0.023	34	ND (0.005)	41
41-II	4/20/2021	0.031	0.12	ND (0.00009)	ND (0.005)	0.001	ND (0.1)	ND (0.0005)	0.021	29	ND (0.005)	38
41-II	7/27/2021	0.033	0.13	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.039	30	ND (0.005)	38
41-II	10/27/2021	0.052	0.22	0.0002	ND (0.005)	0.001	ND (0.1)	ND (0.0005)	0.098	57	0.01	53
46-IIR	1/27/2021	0.069	0.24	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.092	180	0.01	270
46-IIR	4/21/2021	0.076	0.23	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.100	220	ND (0.005)	370
46-IIR	7/28/2021	0.068	0.21	ND (0.00009)	ND (0.005)	ND (0.0009)	0.16	ND (0.0005)	0.150	210	ND (0.005)	390
46-IIR	11/3/2021	0.063	0.31	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	0.00091	0.022	180	ND (0.005)	270
48-II	1/29/2021	0.030	1.30	ND (0.00045)	ND (0.025)	ND (0.0045)	ND (0.5)	ND (0.0025)	0.140	310	ND (0.025)	470
48-II	4/21/2021	0.032	1.40	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.140	360	ND (0.005)	510
48-II	8/3/2021	0.032	1.50	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.140	400	ND (0.005)	650
48-II	10/29/2021	0.029	1.50	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.120	290	ND (0.005)	430
56-I	1/26/2021	0.038	0.36	ND (0.00045)	ND (0.025)	ND (0.0045)	0.79	ND (0.0025)	0.074	190	ND (0.025)	420
56-I	1/26/2021	0.036	0.39	ND (0.00009)	ND (0.005)	ND (0.0009)	0.74	ND (0.0005)	0.073	190	ND (0.005)	420
56-I	4/14/2021	0.037	0.33	ND (0.00009)	ND (0.005)	ND (0.0009)	0.71	ND (0.0005)	0.074	170	ND (0.005)	450
56-I	7/26/2021	0.037	0.35	ND (0.00009)	ND (0.005)	ND (0.0009)	0.64	ND (0.0005)	0.069	210	ND (0.005)	480
56-I	7/26/2021	0.037	0.35	ND (0.00009)	ND (0.005)	ND (0.0009)	0.63	ND (0.0005)	0.069	200	ND (0.005)	440
56-I	11/5/2021	0.038	0.34	ND (0.00009)	ND (0.005)	ND (0.0009)	0.77	ND (0.0005)	0.071	210	ND (0.005)	480

Notes:

All units are in mg/L

Metals parameters are dissolved concentrations

Trigger concentrations have been calculated using median 2020-2021 concentrations from background well nest 77 with the RUC Guideline B-7 MABC guidance

0.45	Concentration above its respective Trigger level
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Table 4.7.1D

**RUC Trigger Level Assessment
Upper-Mid Flow Zone
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario**

	Parameter (mg/L) Triggers	Fluoride	Nitrate (as N)	Nitrite (as N)	Sulfate (dissolved)
		0.53	3.250	0.325	750
36-IR	1/26/2021	0.99	ND (0.10)	ND (0.010)	1700
36-IR	4/20/2021	1.00	ND (0.10)	ND (0.010)	1800
36-IR	7/27/2021	1.10	ND (0.10)	ND (0.010)	1700
36-IR	10/27/2021	1.00	ND (0.10)	ND (0.010)	1600
41-II	1/28/2021	0.45	ND (0.10)	ND (0.010)	120
41-II	4/20/2021	0.40	ND (0.10)	ND (0.010)	83
41-II	7/27/2021	0.37	ND (0.10)	ND (0.010)	87
41-II	10/27/2021	0.37	ND (0.10)	ND (0.010)	110
46-IIR	1/27/2021	0.42	ND (0.10)	ND (0.010)	590
46-IIR	4/21/2021	0.40	ND (0.10)	ND (0.010)	570
46-IIR	7/28/2021	0.44	ND (0.10)	ND (0.010)	610
46-IIR	11/3/2021	0.50	ND (0.10)	ND (0.010)	590
48-II	1/29/2021	0.77	ND (0.10)	ND (0.010)	1400
48-II	4/21/2021	0.78	ND (0.10)	ND (0.010)	1600
48-II	8/3/2021	0.73	ND (0.10)	ND (0.010)	1500
48-II	10/29/2021	0.86	ND (0.10)	ND (0.010)	1600
56-I	1/26/2021	0.41	ND (0.10)	ND (0.010)	710
56-I	1/26/2021	0.43	ND (0.10)	ND (0.010)	710
56-I	4/14/2021	0.41	ND (0.10)	ND (0.010)	650
56-I	7/26/2021	0.48	ND (0.10)	ND (0.010)	630
56-I	7/26/2021	0.48	ND (0.10)	ND (0.010)	590
56-I	11/5/2021	0.35	ND (0.10)	ND (0.010)	660

Notes:

All units are in mg/L

Metals parameters are dissolved concentrations

Trigger concentrations have been calculated using median 2020-2021 concentrations from background well nest 77 with the RUC Guideline B-7 MABC guidance

0.45	Concentration above its respective Trigger level
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Table 4.7.1E

**RUC Trigger Level Assessment
Lower-Mid Flow Zone
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario**

Parameter (mg/L)	Barium (dissolved)	Boron (dissolved)	Cadmium (dissolved)	Chromium (dissolved)	Copper (dissolved)	Iron (dissolved)	Lead (dissolved)	Manganese (dissolved)	Sodium (dissolved)	Zinc (dissolved)	Chloride (dissolved)	Fluoride
Triggers	0.355	5.83	0.005	0.2	0.523	2.65	0.021	0.73	8600	2.63	30125	0.53
44-II 1/27/2021	0.041	0.05	ND (0.00009)	ND (0.005)	ND (0.0009)	0.22	ND (0.0005)	0.03	27	0.01	34	0.24
44-II 4/19/2021	0.041	0.03	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.03	20	0.01	32	0.23
44-II 7/28/2021	0.043	0.04	ND (0.00009)	ND (0.005)	ND (0.0009)	0.30	ND (0.0005)	0.04	22	ND (0.005)	23	0.25
44-II 11/3/2021	0.043	0.04	0.000099	ND (0.005)	ND (0.0009)	0.64	0.0018	0.06	18	0.01	28	0.27
45-II 1/27/2021	0.040	0.07	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.04	100	0.02	220	0.23
45-II 4/19/2021	0.026	0.03	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.00	25	0.02	60	0.20
45-II 7/28/2021	0.041	0.04	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.04	60	0.04	140	0.27
45-II 11/2/2021	0.047	0.06	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.02	57	0.05	140	0.24

Notes:

All units are in mg/L

Trigger concentrations have been calculated using median 2020-2021 concentrations from background well nest 77 with the RUC Guideline B-7 MABC guidance

0.45 Concentration above its respective Trigger level

Notes

All units are in mg/L

Trigger concentrations have been calculated using median 2020-2021 concentrations from background well nest 77 with the RUC Guideline B-7 MABC guidance

0.45

Table 4.7.1E
RUC Trigger Level Assessment
Lower-Mid Flow Zone
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario

	Parameter (mg/L)	Nitrate (as N)	Nitrite (as N)	Sulfate (dissolved)
	Triggers	3.25	0.33	750
44-II	1/27/2021	ND (0.10)	ND (0.010)	150
44-II	4/19/2021	ND (0.10)	ND (0.010)	110
44-II	7/28/2021	ND (0.10)	ND (0.010)	130
44-II	11/3/2021	ND (0.10)	ND (0.010)	86
45-II	1/27/2021	ND (0.10)	ND (0.010)	140
45-II	4/19/2021	ND (0.10)	ND (0.010)	53
45-II	7/28/2021	ND (0.10)	ND (0.010)	99
45-II	11/2/2021	ND (0.10)	ND (0.010)	97

Concentrations have been calculated using median 2020-2021 concentrations from background well nest 77
 in line B-7 MABC guidance
 Concentration above its respective Trigger level

Table 4.7.1F
RUC Trigger Level Assessment
Lower Flow Zone
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario

Parameter (mg/L) Triggers	Barium (dissolved) 0.370	Boron (dissolved) 5.23	Cadmium (dissolved) 0.005	Chromium (dissolved) 0.20	Copper (dissolved) 0.523	Iron (dissolved) 2.65	Lead (dissolved) 0.021	Manganese (dissolved) 1.13	Sodium (dissolved) 11600	Zinc (dissolved) 2.63	Chloride (dissolved) 37125	
ID	Date											
35-III	1/26/2021	0.110	0.43	ND (0.00045)	ND (0.025)	ND (0.0045)	1.20	ND (0.0025)	0.11	360	ND (0.025)	940
35-III	4/16/2021	0.085	0.32	ND (0.00009)	ND (0.005)	ND (0.0009)	3.80	ND (0.0005)	0.17	220	ND (0.005)	510
35-III	4/16/2021	0.087	0.32	ND (0.00009)	ND (0.005)	ND (0.0009)	3.60	ND (0.0005)	0.16	220	0.01	530
35-III	7/26/2021	0.110	0.41	ND (0.00009)	ND (0.005)	ND (0.0009)	2.80	ND (0.0005)	0.10	340	ND (0.005)	980
35-III	10/25/2021	0.072	0.40	ND (0.00009)	ND (0.005)	ND (0.0009)	1.30	ND (0.0005)	0.08	250	ND (0.005)	650
44-I	1/27/2021	0.019	0.23	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.04	230	ND (0.005)	310
44-I	4/19/2021	0.020	0.20	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.03	210	ND (0.005)	290
44-I	4/19/2021	0.020	0.19	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.03	200	ND (0.005)	280
44-I	7/28/2021	0.019	0.28	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.04	260	ND (0.005)	340
44-I	11/3/2021	0.026	0.18	0.00012	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.03	190	ND (0.005)	340
45-I	1/27/2021	0.049	0.04	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.02	18	0.02	40
45-I	4/19/2021	0.047	0.04	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.02	17	0.02	46
45-I	7/28/2021	0.047	0.04	ND (0.00009)	ND (0.005)	ND (0.0009)	0.24	ND (0.0005)	0.03	17	0.01	42
45-I	11/2/2021	0.048	0.04	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.03	17	0.01	50
48-I	1/29/2021	0.010	2.10	ND (0.00045)	ND (0.025)	ND (0.0045)	ND (0.5)	ND (0.0025)	0.09	610	ND (0.025)	1500
48-I	4/21/2021	0.013	2.30	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.10	700	ND (0.005)	1800
48-I	4/21/2021	0.013	2.20	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.10	710	ND (0.005)	1700
48-I	8/3/2021	0.016	2.00	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.12	960	ND (0.005)	2200
48-I	10/29/2021	0.013	2.00	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.09	620	ND (0.005)	1400
48-I	10/29/2021	0.013	1.90	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.09	620	ND (0.005)	1400
60-IV	1/29/2021	0.014	1.40	ND (0.00045)	ND (0.025)	ND (0.0045)	ND (0.5)	ND (0.0025)	0.09	650	ND (0.025)	1300
60-IV	4/21/2021	0.016	1.30	ND (0.00009)	ND (0.005)	ND (0.0009)	0.41	ND (0.0005)	0.10	710	ND (0.005)	1300
60-IV	4/21/2021	0.015	1.40	ND (0.00009)	ND (0.005)	ND (0.0009)	0.14	ND (0.0005)	0.10	680	ND (0.005)	1300
60-IV	7/30/2021	0.015	1.40	ND (0.00009)	ND (0.005)	ND (0.0009)	0.18	ND (0.0005)	0.10	680	ND (0.005)	1200
60-IV	10/29/2021	0.014	1.30	ND (0.00009)	ND (0.005)	ND (0.0009)	ND (0.1)	ND (0.0005)	0.09	680	ND (0.005)	1200

Notes:

All units are in mg/L

Metals parameters are dissolved concentrations

Trigger concentrations have been calculated using median 2020-2021 concentrations from background well nest 77

with the RUC Guideline B-7 MABC guidance

0.45	Concentration above its respective Trigger level
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Table 4.7.1F

**RUC Trigger Level Assessment
Lower Flow Zone
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario**

	Parameter (mg/L) Triggers	Fluoride 0.49	Nitrate (as N) 3.25	Nitrite (as N) 0.33	Sulfate (dissolved) 710
ID	Date				
35-III	1/26/2021	0.35	ND (0.10)	ND (0.010)	1300
35-III	4/16/2021	0.30	ND (0.10)	ND (0.010)	1200
35-III	4/16/2021	0.34	ND (0.10)	ND (0.010)	1200
35-III	7/26/2021	0.39	ND (0.10)	ND (0.010)	1100
35-III	10/25/2021	0.39	ND (0.10)	ND (0.010)	1200
44-I	1/27/2021	0.50	ND (0.10)	ND (0.010)	580
44-I	4/19/2021	0.51	ND (0.10)	ND (0.010)	520
44-I	4/19/2021	0.48	ND (0.10)	ND (0.010)	510
44-I	7/28/2021	0.63	ND (0.10)	ND (0.010)	840
44-I	11/3/2021	0.56	ND (0.10)	ND (0.010)	600
45-I	1/27/2021	0.22	ND (0.10)	ND (0.010)	100
45-I	4/19/2021	0.24	ND (0.10)	ND (0.010)	100
45-I	7/28/2021	0.26	ND (0.10)	ND (0.010)	99
45-I	11/2/2021	0.24	ND (0.10)	ND (0.010)	100
48-I	1/29/2021	0.80	ND (0.10)	ND (0.010)	1600
48-I	4/21/2021	0.77	ND (0.10)	ND (0.010)	1700
48-I	4/21/2021	0.77	ND (0.10)	ND (0.010)	1700
48-I	8/3/2021	0.67	ND (0.10)	ND (0.010)	1200
48-I	10/29/2021	0.85	ND (0.10)	ND (0.010)	1500
48-I	10/29/2021	0.85	ND (0.10)	ND (0.010)	1400
60-IV	1/29/2021	0.96	ND (0.10)	ND (0.010)	1700
60-IV	4/21/2021	0.96	ND (0.10)	ND (0.010)	1800
60-IV	4/21/2021	0.98	ND (0.10)	ND (0.010)	1800
60-IV	7/30/2021	1.00	ND (0.10)	ND (0.010)	1400
60-IV	10/29/2021	1.00	ND (0.10)	ND (0.010)	1500

Notes:

All units are in mg/L

Metals parameters are dissolved concentrations

Trigger concentrations have been calculated using median 2020-2021 concentrations from background well nest 77 with the RUC Guideline B-7 MABC guidance

0.45	Concentration above its respective Trigger level
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Water Quality Assessment - Shallow/Eramosa Flow Zone
2021 Annual Monitoring Report
GFL Environmental Operating Stoney Creek Regional Facility
Stoney Creek, Ontario

Monitor	Impacted Yes/No 2021	General Quality Trend	Ratios				Phenols (mg/L)	Impacted Yes/No 2020
			NH ₃ /Sr Cl/Mg					
35-V	No	Stable	0.1447 0.076 0.0192 0.077				ND - ND	No
			0.43 0.35 7.76 0.38					
36-IVR	No	Stable	0.025 0.039 0.022 0.046				ND - ND	No
			0.67 0.38 3.2 1.9					
41-III	No	Stable/ Minor Decrease	0.06 0.065 0.068 (0.07) 0.057				ND - 0.0011	No
			0.94 0.92 0.98 (1.0) 1.01					
47-IV	No	Stable	0.0667 (0.055) 0.0417 0.024 0.077				ND - ND	No
			1.6 (1.6) 2.8 2.8 0.95					
48-IV	No	Stable/ Minor Increase	0.039 0.0370 0.039 0.0455				ND - ND	No
			0.96 7.0 6.3 3.4					
49-IV	No	Variable	0.25 0.11 (0.12) 0.188 0.104				ND - ND	No
			1.1 5.5 (5.5) 5.6 3.2					
50-II	No	Stable	0.0125				ND - ND	No
			0.31					
51-V	No	Seasonal	0.0294 0.065 0.08 0.0278				ND - ND	No
			4.0 3.6 4.9 3.5					
52-III	No	Stable	0.083 0.122 0.0829 0.117				ND - 0.0011	No
			0.266 0.267 0.289 0.177					
77-III	No	-	0.058 0.068 (0.089) 0.056				ND - ND	No
			2.84 3.67 (3.67) 1.81					
P4-IV	No	Stable	0.125 0.102 0.25				ND - ND	No
			0.93 0.46 0.44					
P8-II	No	Variable	0.055 0.052 0.22 0.0407				ND - 0.0018	No
			1.944 2.94 2.2 3.4					
P9-II	No	Variable	0.06 (0.06) 0.037 0.037 (0.046) 0.23				ND - 0.0012	No
			7.55 (7.39) 9.29 8.8 (8.8) 2.3					
P10-V	No	Stable to decreasing	0.064 0.083 0.054 0.0704				ND - ND	No
			0.26 1.28 1.1 0.22					
G11	No	Stable	0.025 0.029 0.029 0.056				ND - ND	No
			22.45 34.09 25 12.5					
G13	No	Stable	0.0313 0.0294 0.0294 0.0455				ND - ND	No
			7.31 6.15 6.04 3.25					

**Water Quality Assessment - Shallow/Eramosa Flow Zone
2021 Annual Monitoring Report
GFL Environmental Operating Stoney Creek Regional Facility
Stoney Creek, Ontario**

Monitor	Impacted Yes/No 2021	General Quality Trend	Ratios	Phenols (mg/L)	Impacted Yes/No 2020
			NH ₃ /Sr		
			Cl/Mg		
G24	No	Stable to decreasing	0.0294 0.0575 0.0409 0.0455	ND - ND	No
			0.11 0.232 1.9 0.146		
G27	No	Variable	0.0455 0.052 0.482 0.028	ND - 0.0024	No
			1.34 1.51 4.58 3.13		

Notes:

Laboratory limits have been used for non-detects in ratios

Rationale for Decision:

NH₃/Sr ratio above 0.5 or Cl/Mg ratio above 25

or low ratios but high phenols indicates Closed Facility landfill leachate impacts

**Water Quality Assessment - Vinemount Flow Zone
2021 Annual Monitoring Report
GFL Environmental Operating Stoney Creek Regional Facility
Stoney Creek, Ontario"**

Monitor	Impacted Yes/No 2021	General Quality Trend	Ratios				Phenols (mg/L)	Impacted Yes/No 2020
			NH ₃ /Sr Cl/Mg					
9-I	No	Seasonal	0.02 0.02 0.02 0.09				ND - 0.001	No
			1.88 2.59 3.17 1.62					
29-II	No	Seasonal	0.29 0.02 0.26 0.06				ND - ND	No
			5.15 5.88 5.36 3.28					
31-III	Yes	Stable	3.67 3.11 3.87 2.57				ND - 0.026	Yes
			23.91 23.33 22.80 18.33					
33-I	Yes	Variable	1.60 2.05 0.02 0.08				ND - ND	Yes
			20.00 30.00 26.15 7.53					
35-VII	No	Cyclical	0.05 0.04 0.15 0.06				ND - ND	No
			1.06 0.76 4.48 0.84					
36-VR	Yes	Increasing	27.60 18.15 28.70 7.69				ND - 0.3	Yes
			51.143 36.36 58.06 21.03					
40-III	Yes (minor)	Stable	0.60 (1.24) 1.29 1.22 1.25				ND - ND	Yes (minor)
			5.00 (5) 6.30 5.83 5.06					
42-III	Yes (minor)	Stable	0.64 0.84 0.83 0.67				0.0011 - 0.0034	Yes (minor)
			8.00 4.60 7.50 2.67					
47-III	No	Stable	0.25 0.22 0.26 (0.26) 0.21				ND - ND	No
			2.75 5.51 1.74 (1.77) 3.167					
48-V	No	Variable	0.192 0.26 0.23 (0.23) 0.26				ND - ND	No
			6.75 6.30 7.20 (7.14) 4.35					
49-V	No	Variable	0.25 0.26 0.26 0.11				ND - ND	No
			1.27 0.82 0.64 2.07					
51-IV	Yes (minor)	Variable	0.73 (0.75) 0.69 0.72 0.63				ND - ND	Yes (minor)
			3.80 (3.84) 3.64 5.33 4.09					
52-II	Yes	--	78.57 50.0				0.15 - 0.4	Yes
			974.36 322.03					
60-III	No	Stable	0.13 0.11 0.14 0.12				ND - ND	No
			2.73 4.71 3.38 3.57					
61-III	No	Variable	0.29 0.33 (0.19) 0.28 0.31				ND - 0.001	No
			7.53 8.42 (4.29) 5.00 6.54					
68-IV	No	Stable	0.03 0.01 0.01 0.01				ND - ND	No
			3.41 2.48 3.25 2.41					
70-III	-	-	-				-	-
			-					

**Water Quality Assessment - Vinemount Flow Zone
2021 Annual Monitoring Report
GFL Environmental Operating Stoney Creek Regional Facility
Stoney Creek, Ontario"**

Monitor	Impacted Yes/No 2021	General Quality Trend	Ratios	Phenols (mg/L)	Impacted Yes/No 2020
			NH ₃ /Sr Cl/Mg		
P5-IVR	No	Stable	0.07 0.09 0.16 0.01	0.0013 - 0.002	No
			0.41 0.38 0.42 0.29		
P7-IV	Yes	Variable	58.46 23.23 11.18 15.38	0.96 - 3	Yes
			28.30 17.19 6.07 14.29		
P9-IIIIR	Yes	Stable	0.59 0.95 5.48 0.58	ND - 0.0039	Yes
			8.20 10.78 23.87 8.33		
P10-IV	Yes	Stable	0.55 0.55 0.54 0.49	ND - ND	Yes
			3.95 5.00 4.63 3.66		
Groundwater Pump Station	Not used during the current or previous monitoring period				
North Sump	Not used during the current or previous monitoring period				

Notes:

Laboratory limits have been used for non-detects in ratios

Rationale for Decision:

NH₃/Sr ratio above 0.5 or Cl/Mg ratio above 25

or low ratios but high phenols indicates Closed Facility landfill leachate impacts

**Water Quality Assessment - Upper Flow Zone
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Stoney Creek, Ontario"**

Monitor	Impacted Yes/No 2021	General Quality Trend	Ratios		Phenols (mg/L)	Impacted Yes/No 2020
			NH ₃ /Sr	Cl/Mg		
29-III	Monitor has very slow response. Sampling suspended.					
30-I	Yes	Variable	9 9.55 10		1.4 - 2.1	Yes
			9200 11000 7600			
31-I	Yes	Variable	479.17 442.31 460 214.29		0.32 - 1.5	Yes
			1666.67 2136.36 2400 197.37			
35-IV	Yes	Increasing	12 12.40 12.61 13.39 (13.44)		0.23 - 0.56	Yes
			105 102.56 100 103.13 (109.38)			
36-III	Yes (minor)	Stable	0.57 0.56 0.53 0.48		ND - ND	Yes (minor)
			7.73 8.33 8.33 7.36			
40-IIR	Yes (minor)	Variable	1.22 1.19 (1.14) 1.16 1.07 (1.18)		ND - ND	Yes (minor)
			5.19 6.04 (6.02) 6.08 4.33 (5.49)			
42-II	Yes	Variable	1.15 0.92 1.58 1.44		ND - 0.071	Yes
			5.23 4.67 5.25 2.15			
46-III	No	Stable	0.08 0.09 0.06 0.07		ND - 0.0038	No
			3.04 2.98 2.31 2.75			
47-IIR	No	Stable	0.039 (0.04) 0.02 0.13 0.02		ND - ND	No
			1.79 (1.75) 5.85 2.88 4.19			
48-III	Monitor has very slow response. Sampling suspended in response to CPTSS Project. Previous results had shown no impacts.					
49-III	Monitor has very slow response. Sampling suspended in response to CPTSS Project. Previous results had shown no impacts.					
50-I	Monitor has very slow response. Sampling suspended in response to CPTSS Project. Previous results had shown no impacts.					
56-II	No	Stable to declining	0.12		ND - ND	No
			4.43			
57-IR	Yes	Variable	140 200 169.23 219.78		0.92 - 1.1	Yes
			2352.94 3727.27 2352.94 6779.66			
60-II	Yes (minor)	Stable	0.69 0.71 0.64 0.61 (0.67)		ND - ND	Yes (minor)
			4.42 5.21 4.70 5.14 (5.14)			
61-II	No	Variable	0.16 0.19 0.25 0.30 (0.27)		ND - 0.0012	No
			3.79 4.67 4.94 4.21 (4.04)			
62-IV	No	Stable	1.31 0.65 0.31 0.07		ND - ND	No
			6.19 5.36 4.49 2.86			
67-III	Yes	Variable	6 5.71 4.55 1.32		ND - 0.02	Yes
			6.29 4.05 6.45 0.18			
68-III	Yes	Variable	50 171.88 89.66 107.50		0.16 - 0.94	Yes
			424.24 733.33 466.67 209.52			

**Water Quality Assessment - Upper Flow Zone
2021 Annual Monitoring Report
GFL Environmental Operating Stoney Creek Regional Facility
Stoney Creek, Ontario"**

Monitor	Impacted Yes/No 2021	General Quality Trend	Ratios		Phenols (mg/L)	Impacted Yes/No 2020
			NH ₃ /Sr	Cl/Mg		
70-IIR	-	-	-	-	-	-
72-III	No	Stable	0.42 (0.42) 0.41 0.37		0.002 - 0.0061	No
			16.19 (15) 17.91 18			
75-IV	Yes (minor)	Stable	0.6 0.77 1.45		ND - ND	No
			6.21 4.69 2.04			
P1-III	Yes (minor)	Variable	0.42 0.24 2.95 0.27		ND - 0.047	Yes (minor)
			0.56 0.88 7.40 0.67			
P3-II	Yes	Variable	0.73 1.75 5.67 2.06		0.027 - 0.083	Yes
			15 14.77 23.33 13.64			
P4-II	Yes	Variable	86.96 (91.67) 150 64.29 (67.86) 63.16		0.71 - 1.3	Yes
			204.76 (200) 372.73 195.45 (169.57) 141.18			
P5-IIIIR	Yes	Variable	25.50 29.09 27.50 23.75		0.05 - 0.32	Yes
			30 50 32.56 35.71			
P6-IR	Yes	Variable	247.06		1.0	Yes
			4352.94			
P7-III	Yes	Variable	27.65 15.36 10.61 8.67		0.26 - 0.39	Yes
			53.53 33.45 24.14 20			
P8-I	Yes	Variable	30.19 31.37 28.07 25.86		0.0056 - 0.0066	Yes May sample is inconsistent
			42.73 40 37.27 57.89			
P9-I	Yes (minor)	Variable	0.75 0.79 0.77 0.84		ND - 0.0016	Yes
			12.14 15.71 15.24 13.57			
P10-III	No	Stable	0.44 0.45 0.47 0.47		ND - ND	No
			6.11 7.06 6.67 5.79			
P11-III	Yes	Variable	19.32 (20.48) 18.46 20.69 (22.62) 32.0		0.18 - 0.64	Yes
			1421.05 (1080) 552.63 500 (470.59) 571.43			
P12	Yes	Variable/ Decreasing	2.17 3.55 8.82 2.61		0.13 - 0.62	Yes
			11.90 21.43 370.37 16.43			
P14	Yes	Variable	218.18 96 100 91.67		0.064 - 0.49	Yes
			294.44 82 241.38 98.04			
P15	Yes	Variable	121.43 107.14 121.43 146.07		0.46 - 0.92	Yes
			2357.14 2062.5 2000 961.54			
P16	Yes	Variable	3.22 11.43 5.79 2.70 (2.65)		0.0015 - 0.15	Yes
			9.04 19.02 9.33 10 (9.05)			
P17	Yes	Variable/ Increasing	222.22 246.38 110 119.57		0.45 - 0.71	Yes
			2000 6938.78 621.62 1210.53			
CW3	Yes	Variable/ Decreasing	10 9.53 8.73		0.21 - 0.33	Yes
			66.67 92.86 95.65			

**Water Quality Assessment - Upper Flow Zone
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GFL Environmental Operating Stoney Creek Regional Facility
Stoney Creek, Ontario"**

Monitor	Impacted Yes/No 2021	General Quality Trend	Ratios	Phenols (mg/L)	Impacted Yes/No 2020
			NH ₃ /Sr Cl/Mg		
CW5R	Yes	Variable	87.50 100 83.33	0.42 - 0.77	Yes
			186.67 207.69 158.82 111.76		
CW16	Yes	Variable	0.83 0.76 2.73 0.58	ND - 0.015	Yes
			1.30 0.86 1.98 1.51		
M5A	Water levels have not recovered since completion of CPTSS Project. M5A was not operating in 2021. Past results have shown consistently impacted UFZ water.				

Notes:

Laboratory limits have been used for non-detects in ratios

Rationale for Decision:

NH₃/Sr ratio above 0.5 or Cl/Mg ratio above 25

or low ratios but high phenols indicates Closed Facility landfill leachate impacts

Water Quality Assessment - Upper Mid Flow Zone
2021 Annual Monitoring Report
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Monitor	Impacted Yes/No 2021	General Quality Trend	Ratios		Phenols (mg/L)	Impacted Yes/No 2020
			NH ₃ /Sr			
			Cl/Mg			
29-I	Yes	Stable	2.5 (2.5) 2.65 2.8 (2.8) 2.26		ND - ND	Yes
			9.09 (10.12) 9.23 8.10 (8.22) 9.11			
35-VI	Yes	Variable	2.44 2.47 2.32 2.27		0.0032 - 0.0055	Yes
			32.53 32.05 25.27 28.89			
36-IR	Yes	Stable	1.21 1.22 1.23 1.07		ND - 0.0011	Yes
			9.09 11 12.63 10.91			
40-I	Yes (minor)	Variable	0.65 0.70 0.73 (0.71) 0.75		ND - ND	Yes (minor)
			4.8 6.80 5.73 (5.54) 5.98			
41-II	No	Stable	0.05 0.06 0.06 0.04		ND - ND	No
			0.65 0.66 0.69 0.77			
46-II	-	-	-		-	decom.
			-			
46-IIR	No	Stable	0.09 0.07 0.08 0.02		ND - 0.0010	No
			4.43 5.52 4.48 4.82			
47-I	Yes	Stable	1.14 1.14 (1.11) 1.02 1.02 (0.96)		ND - 0.0014	Yes
			4.67 5.05 (5.05) 4.89 5.11 (5.15)			
48-II	No	Stable	0.23 0.30 0.27 0.26		ND - ND	No
			5.66 5.2 6.5 4.73			
49-II	No	Variable	0.11 0.23 0.23 0.16 (0.16)		ND - ND	No
			6.08 1.26 0.91 3.19 (3.25)			
56-I	No	Variable	0.19 (0.2) 0.19 0.22 (0.22) 0.19		ND - ND	No
			3.50 (3.5) 4.64 4.00 (4) 4.36			
60-I	Yes (minor)	Increasing	0.75 0.79 0.73 (0.74) 0.70		ND - 0.0023	Yes (minor)
			14 13.64 11.82 (11.82) 13.64			
61-I	Yes (minor)	Stable	0.75 (0.78) 0.72 0.67 0.61		ND - 0.0018	Yes (minor)
			7.32 (7.20) 6.82 7.17 7.10			
62-III	No	Stable	0.20 0.28 (0.27) 0.22 0.23		ND - ND	No
			2.77 2.14 (2.14) 2.88 2.95			
67-II	Yes	Variable	4.49 3.93 2.94 3.11		0.0012 - 0.0015	Yes
			12.66 8.61 9.53 11.31			

Water Quality Assessment - Upper Mid Flow Zone
2021 Annual Monitoring Report
GFL Environmental Operating Stoney Creek Regional Facility
Stoney Creek, Ontario

Monitor	Impacted Yes/No 2021	General Quality Trend	Ratios		Phenols (mg/L)	Impacted Yes/No 2020
			NH ₃ /Sr			
			Cl/Mg			
68-II	No	Stable	0.12 0.11 0.12 (0.11) 0.10		ND - ND	No
			3.43 3.93 2.50 (2.69) 7.0			
70-I	-	-	-		-	decom.
			-			
72-II	No	Stable	0.24 0.23 (0.24) 0.21		ND - 0.013	No
			20 14.62 (17.69) 16.67			
75-III	Yes	Stable	0.62 0.69 0.75 (0.80) 0.64		ND - ND	Yes
			4.64 5.06 5.6 (5.46) 2.97			
P3-III	No	Stable	0.12 0.10 0.16 0.15		ND - ND	No
			6.09 6.09 6.70 6.49			
P4-III	Yes	Stable	1.60 1.67 1.60 1.82		ND - 0.0024	Yes
			30.56 31.51 29.63 32.86			
P5-IIR	No	Stable	0.31 0.29 0.27 0.25		ND - 0.0013	No
			3.09 3.58 3.8 3.23			
P7-II	Yes	Stable	5.25 5.0 4.23 7.20		0.17 - 0.65	Yes
			25.65 21.28 18.27 22.31			
P10-II	Yes	Variable	1.85 2.33 (2.42) 3.00 3.36		0.016 - 0.035	Yes
			30.0 33.64 (31.82) 27.27 31.0			
P11-II	No	Stable	0.13 0.13 0.12 0.12		ND - ND	No
			3.08 3.23 2.57 2.99			
M5R	Yes	Variable	11.5 16.8 11.67		0.0088 - 0.023	Yes
			15.81 40 20			

Notes:

Laboratory limits have been used for non-detects in ratios

Rationale for Decision:

NH₃/Sr ratio above 0.5 or Cl/Mg ratio above 25

or low ratios but high phenols indicates Closed Facility landfill leachate impacts

**Water Quality Assessment - Lower-Mid Flow Zone
2021 Annual Monitoring Report
GFL Environmental Operating Stoney Creek Regional Facility
Stoney Creek, Ontario"**

Monitor	Impacted Yes/No 2021	General Quality Trend	Ratios		Phenols (mg/L)	Impacted Yes/No 2020
			NH ₃ /Sr	Cl/Mg		
29-IV	Yes	Stable	3.0 2.94 (3.0) 2.73 2.31 (2.45)		ND - ND	Yes
			9.26 10 (9.87) 10.11 9.19 (9.31)			
42-I	No (only one sample)	Decreasing	0.47		0.0013	Yes (minor)
			5.13			
43-II	No	Decreasing	0.25 0.25 0.25 0.25		ND - ND	No
			4.42 4.72 4.17 3.97			
44-II	No	Stable	0.05 0.05 0.06 0.06		ND - ND	No Jan. data is erroneous
			0.79 0.82 0.43 0.76			
45-II	No	Seasonal	0.30 0.12 0.18 0.20		ND - ND	No
			4.40 2.73 3.59 3.68			
62-II	Yes	Decreasing	3.02 (3.98) 3.82 2.58 2.44		ND - ND	Yes
			16.67 (17.24) 16.47 15.19 15.0			
67-I	Yes	Decreasing	4.77 (5.06) 4.66 4.38 (4.43) 3.93		ND - 0.0017	Yes
			19.40 (19.40) 20.0 19.35 (19.05) 19.05			
75-II	Yes	Decreasing	2.8 2.7 2.7 2.5		ND - 0.0013	Yes
			22.22 22 24.49 18.11			
76-III	No	Stable to decreasing	0.07 0.08 0.05 0.07		ND - ND	No
			4.06 3.27 4.60 1.79			
77-II	No	Variable	0.12 0.16 0.13		ND - 0.051	No
			15.50 15.48 20.69			
P1-II	Yes	Stable	4.66 5.14 5.14 4.67		ND - 0.0015	Yes
			18.57 18.75 17.39 16.67			
P3-I	Yes	Variable	2.14		ND - ND	Yes (minor)
			12.37			
Seep A4	Not sampled due to safe access issues. Not impacted during previous years.					

Notes:

Laboratory limits have been used for non-detects

Rationale for Decision:

NH₃/Sr ratio above 0.5 or Cl/Mg ratio above 25

or low ratios but high phenols indicates Closed Facility landfill leachate impacts

**Water Quality Assessment - Lower Flow Zone
2021 Annual Monitoring Report
GFL Environmental Operating Stoney Creek Regional Facility
Stoney Creek, Ontario**

Monitor	Impacted Yes/No 2021	General Quality Trend	Ratios		Phenols (mg/L)	Impacted Yes/No 2020
			NH ₃ /Sr	Cl/Mg		
14-I	No	Seasonal	0.02 0.07 0.03 0.02		ND - ND	No
			0.65 1.37 0.71 0.68			
35-III	Yes (minor)	Variable	0.65 0.59 (0.60) 0.52 0.59		ND - 0.0011	Yes (minor)
			13.06 9.64 (9.11) 13.42 12.75			
36-IIR	No	Stable	0.28 0.3 0.29 0.30		ND - 0.004	No
			15.24 16.67 17.89 16.92			
41-I	Yes (minor)	Decreasing	1.18 0.97 0.79 0.63 (0.64)		ND - ND	Yes
			11.61 11.82 11.97 9.50 (9.32)			
43-I	Yes	Decreasing	1.17 1.23 (1.33) 0.92 0.85 (0.85)		ND - 0.0032	Yes
			10.91 13.33 (13.04) 10 8.48 (9.77)			
44-I	No	Variable	0.17 0.14 (0.14) 0.25 0.13		ND - 0.0032	No
			6.6 7.57 (7.44) 6.54 8.10			
45-I	No	Stable	0.04 0.04 0.08 0.05		ND - 0.0038	No
			1.08 1.44 1.17 1.39			
46-IR	Yes	Variable	4.2 3.76 (3.81) 3.84 3.26		ND - 0.0018	Yes
			17.81 18.57 (17.33) 20.55 17.72			
48-I	No	Stable	0.24 (0.24) 0.26 (0.26) 0.23 0.25 (0.23)		ND - 0.0011	No
			8.82 (8.82) 8.5 (9) 9.57 8.24 (8.24)			
49-IR	Monitor has very slow response. Sampling suspended in response to CPTSS Project. Previous results had shown no impacts.					
60-IV	Yes (minor)	Stable	0.91 (0.91) 0.95 (0.98) 0.93 0.86		ND - ND	Yes (minor)
			11.82 (11.81) 10.83 (10.0) 10 10.91			
62-I	Yes	Decreasing	2.18 2.18 2.18 2		ND - ND	Yes
			16 16 14 14			
68-I	Yes	Decreasing	1.79 (1.7) 1.61 1.50 1.31		ND - ND	Yes
			15.96 (14.14) 15.22 15 13.41			
72-I	No	Variable	0.13 0.13 0.13 (0.128)		0.012 - 0.064	No
			18.75 17 18.61 (20.28)			
75-I	Yes (minor)	Stable	0.523 (0.55) 0.47 0.53 0.50 (0.5)		ND - ND	Yes (minor)
			12.50 (12.50) 13.08 12.73 12.14			
76-II	No	Variable	0.05 0.08 0.04 0.06		ND - ND	No
			4.44 3.57 6.33 2.88			
77-I	No	Variable	0.13 0.14 0.13		ND - 0.065	No
			16.73 17.56 17.57			

**Water Quality Assessment - Lower Flow Zone
2021 Annual Monitoring Report
GFL Environmental Operating Stoney Creek Regional Facility
Stoney Creek, Ontario**

Monitor	Impacted Yes/No 2021	General Quality Trend	Ratios	Phenols (mg/L)	Impacted Yes/No 2020
			NH ₃ /Sr Cl/Mg		
P1-I	Yes	Stable	5.35 6.03 5.59 (5.59) 5.00	ND - 0.0016	Yes
			18.31 19.67 16.18 (17.64) 16.42		
P2-I	Yes	Stable	2.97	ND	Yes
			15.29		
P4-I	Yes	Increasing	3.6 3.36 (3.36) 3.27 3.09 (3.09)	ND - 0.0012	Yes
			20.83 20.83 (20.83) 17.69 21.67 (20.77)		
P5-IR	Yes	Stable	10.57 10.37 9.02 8.64	0.0075 - 0.011	Yes
			27.08 24.53 22.81 25.0		
P7-IR	Yes	Variable	9.58 7.50 (6.47) 1.82 1.75 (1.91)	0.043 - 1.2	No Oct. results
			50 24.55 (31.54) 12.14 20.71 (21.54)		
P10-I	Yes	Stable	2.33 0.85 2.15 2.0	ND - ND	Yes
			21.54 23.33 17.33 17.86		
P11-I	Yes	Variable	4.61 5.0 4.56 4.11 (4.32)	ND - 0.0011	Yes
			16.84 20.73 17.53 16.30 (18.68)		

Notes:

Laboratory limits have been used for non-detects in ratios in ratios

Rationale for Decision:

NH₃/Sr ratio above 0.5 or Cl/Mg ratio above 25

or low ratios but high phenols indicates Closed Facility landfill leachate impacts

**Water Quality Assessment - Rochester
2021 Annual Monitoring Report
GFL Environmental Operating Stoney Creek Regional Facility
Stoney Creek, Ontario**

Monitor	Impacted Yes/No 2021	General Quality Trend	Ratios	Phenols (mg/L)	Impacted Yes/No 2020
			NH ₃ /Sr		
			Cl/Mg		
76-I	No	Variable	0.17 0.194 0.179 0.158	ND - 0.016	No
			19.64 22.17 19.23 20.4		
Seep A2	Not sampled due to safe access issues. Not impacted during previous years.				
Seep A6	Not sampled due to safe access issues. Not impacted during previous years.				

Notes:

Laboratory limits have been used for non-detects in ratios in ratios

Rationale for Decision:

NH₃/Sr ratio above 0.5 or Cl/Mg ratio above 25

or low ratios but high phenols indicates Closed Facility landfill leachate in

Table 4.9

**Surface Water Monitoring Locations Description
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario**

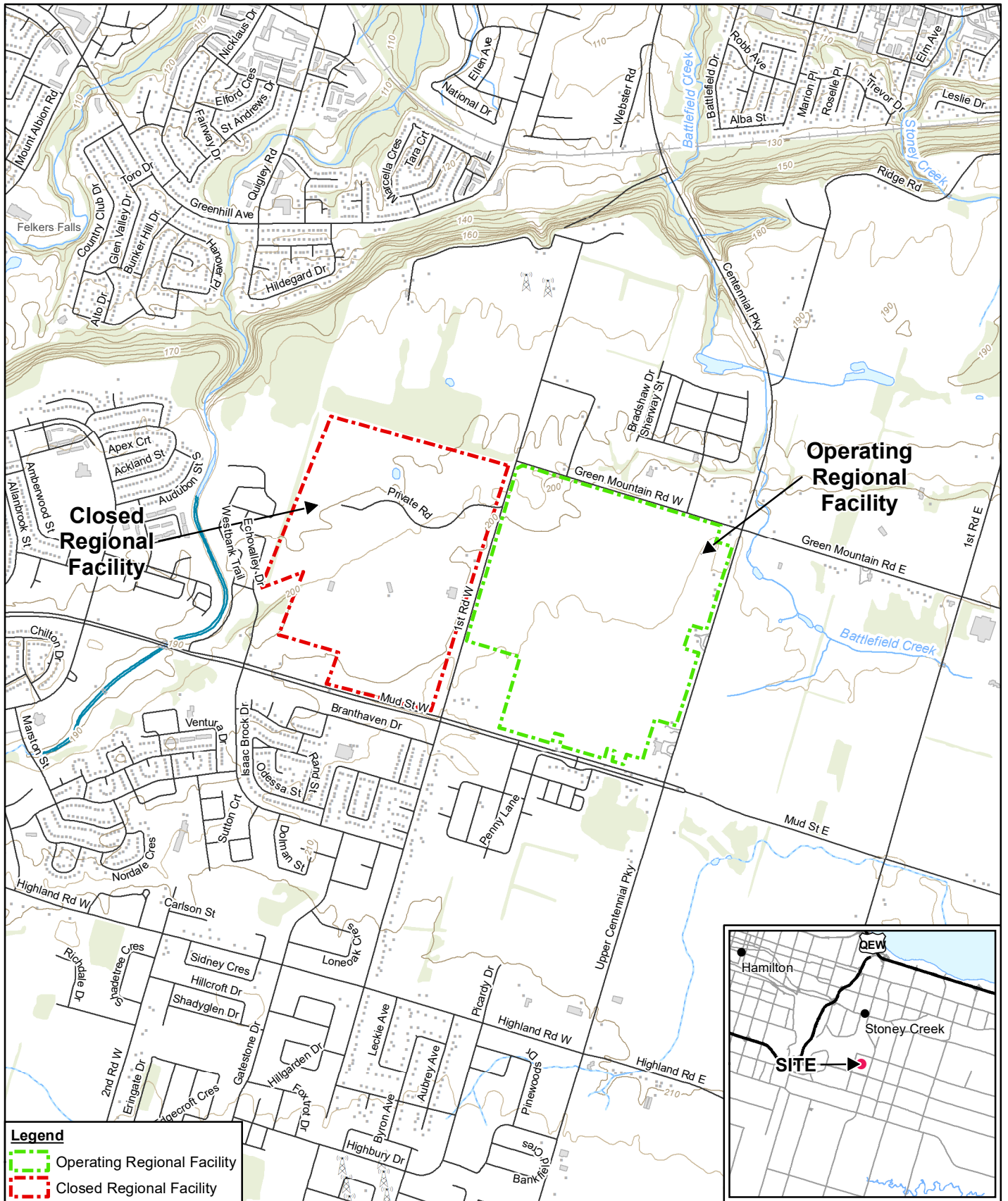
Location	Station	Station Description	Purpose of Station	Required as per ECA?
On Site	Station T-1 (Replaced)	- Station T-1 was a man made ditch located at approximately the midpoint of the northern boundary of the Facility. It carried discharge from a culvert connected to a quarry drainage pipe located within the waste. - In November 1992, a clay lined pond was created near station T-1 and all flow from the quarry drainage pipe was directed to the new pond. This location became surface water monitoring station T-1R and replaced T-1.	Monitor impacted water from waste	Yes
	Station T-1R	- Located in the clay lined pond that was constructed to receive the flow of leachate impacted water. Pond T-1R also receives discharge from the containment wells, the toe drain, the Shatter Trench pumping, and a collection pipe for impacted groundwater along the west boundary. - Since 1993 the impacted water collected at this pond is pumped into the adjacent T-1S equalization pond where it is metered into the sanitary sewer connection.	Monitor impacted water from waste and containment wells	Yes
	Station T-1S	- Station T-1S was constructed in 1993 to receive leachate from the Facility, impacted groundwater from the containment wells, the Shatter Trench pumping, and the discharge from T-1R. Discharges into the sanitary sewer. - The discharge to the sewer is required to meet City sewer use by laws.	Monitor impacted water from waste and containment wells	No
	Station T-3 (Eliminated)	- Station T-3 is located at the confluence of the ditch on the west side of First Road West and the culvert collecting surface runoff at a catch basin on the east side of First Road West. - Following construction of the Sports Park, runoff was redirected from the east side of the roadway to the west along the northern boundary of the Sports Park. - Recent subdivision development has occurred near this station and has resulted in disruptions to the sampling routine. - Could not be sampled after May 2017 due to road reconstruction and the installation of new stormwater infrastructure. Station T-3 no longer exists.	Monitor downstream water quality	Yes
	Station T-3A	- Station T-3A is a clay lined retention pond located within the Operating Facility boundary at the northeast corner of First Road West and Green Mountain Road West. Pond T-3A collects the discharge water from M4, a wheel wash facility, and the Groundwater Pumping Station (South Sump). - All collected water at T-3A is directed through the foremain to the T-1S equalization pond where it is directed to the sanitary sewer.	Monitor impacted water from containment wells and waste processing.	Yes
Upstream of the Facility - West Side	Station T-12	- Located in Davis Creek on the south side and upstream of Mud Street - Located in an area of developing urban expansion.	Represents the quality of upstream surface water in Davis Creek	Yes
	Station T-29	- Located downstream of T-12 in Davis Creek on the north side and downstream of Mud Street - Located where Davis Creek is engineered with a concrete channel extending from Mud Street northward. - The sanitary sewer line construction in the vicinity of Davis Creek has created an alternative pathway for groundwater flow to follow that will prevent upward discharge of groundwater to the streambed regardless of the concrete channelization of the creek bed in this vicinity. Therefore this station will reflect surface water influences from localized inputs in the vicinity of Mud Street and not impacts from the Facility.	Determine changes to surface water quality from urban impacts	No
	Station T-30	- Located at the outlet of a storm sewer that originates from the subdivisions south of Mud Street. - It is thought the storm sewers extend south along Isaac Brock Drive. The storm sewers constructed in 1994 along Mud Street also connect into this storm sewer.	Determine changes to surface water quality from urban impacts	No
	Station T-31	- Located at the end of the engineered concrete channel downstream of T-30. - The trunk sanitary sewer crosses under the streambed several meters below the channel. The construction trench will effectively intercept groundwater and prevent it from discharging to the creek by directing flow towards the north away from the creek.	Determine changes to surface water quality from urban impacts	No
	Station T-32	- Located on a natural rock bottom portion of the Davis Creek near the edge of Felkers Falls, about 6m downstream of a small storm sewer outlet that enters the creek. - The sanitary sewer construction trench located approximately 50m east of this location will intercept any groundwater and prevent it from discharging to the creek by directing it towards the north away from the creek.	Determine changes to surface water quality from urban impacts	No

Table 4.9

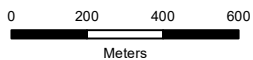
**Surface Water Monitoring Locations Description
2021 Annual Monitoring Report
GFL Environmental Stoney Creek Regional Facility
Stoney Creek, Ontario**

Location	Station	Station Description	Purpose of Station	Required as per ECA?
Downstream of the Facility - West Side	Station T-2 (Eliminated)	- Station T-2 was located downstream of T-1 at the outlet of a man made pond. - In 2001 the City began construction of the Heritage Green Sports Park and the pond at T-2 was filled in and eliminated. Drainage from this area was directed to a swale on the north boundary of the Park.	Monitor water quality in man made pond	No
	Station T-4 (Eliminated)	- Station T-4 was located downstream of T-2 along the western boundary in a flat lying and marshy area. A channel was constructed to carry flow to east of Felkers Falls where it flowed over the escarpment and joined Davis Creek at the base of the escarpment. - Monitoring ceased in November of 2002 with the construction of the Heritage Green Sports Park.	Monitor downstream water quality	Yes
	Station T-13	- Station T-13 is located on Davis Creek below the escarpment, downstream of T-32 and on the north side of the Greenhill Avenue road crossing.	Monitor downstream water quality at bottom of escarpment	No
	Station T-B (Eliminated)	- Station T-B was a groundwater seep on the face of the Niagara Escarpment. - Flow to channel removed in 1993 and seep was buried by a soil failure.	Determine if seepage at T-4 would discharge from the rock face	No
	Station T-28	- Station T-28 is located on Davis Creek, downstream of T-13 and prior to the confluence of the drainage coming from the east side of the Facility and other storm drainage inputs.	Determine changes to surface water quality from urban impacts	Yes
Upstream of the Facility - East Side	Station T-11 (Eliminated)	- Station T-11 is located southeast of the Facility in a drainage ditch at the southeast corner of First Road West and Mud Street. It was originally established in 1989 as an upstream background station representing a small agricultural watershed. Substantial urban development and a residential subdivision has been constructed in the drainage area and the location has been removed by construction of a stormwater management pond.	Monitor upstream water quality	Yes
Downstream of the Facility - East Side	Station T-15	- Station T-15 is located part way down the face of the Niagara Escarpment past the end of First Road West, near the inlet to a storm drain. - Groundwater seepage maintains a low constant flow. During wet weather, runoff from the open fields, drainage from the ditch station T-3, and drainage from a small subdivision adds to the flow entering the storm drain. - Recent subdivision development has occurred near this station and has resulted in disruptions to the sampling routine.	Monitor downstream water quality	Yes
	Station T-23	- Station T-23 is located downstream of T-15 just past a storm sewer outlet that discharges to the drainage channel just before it enters Davis Creek between stations T-28 and T-21.	Determine changes to surface water quality from urban impacts	Yes
Downstream of the Facility - Combined East and West Side	Station T-16	- Station T-16 is located on Davis Creek, downstream from T-21 on the west side of Quigley Road just south of King Street.	Monitor downstream water quality	No
	Station T-21	- Station T-21 is located on Davis Creek, downstream of T-28 and the storm channel where stations T-15 and T-23 are located.	Determine changes to surface water quality from urban impacts	Yes

Figures



Source: MNRF NRVIS, 2015. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2021



Coordinate System:
NAD 1983 UTM Zone 17N

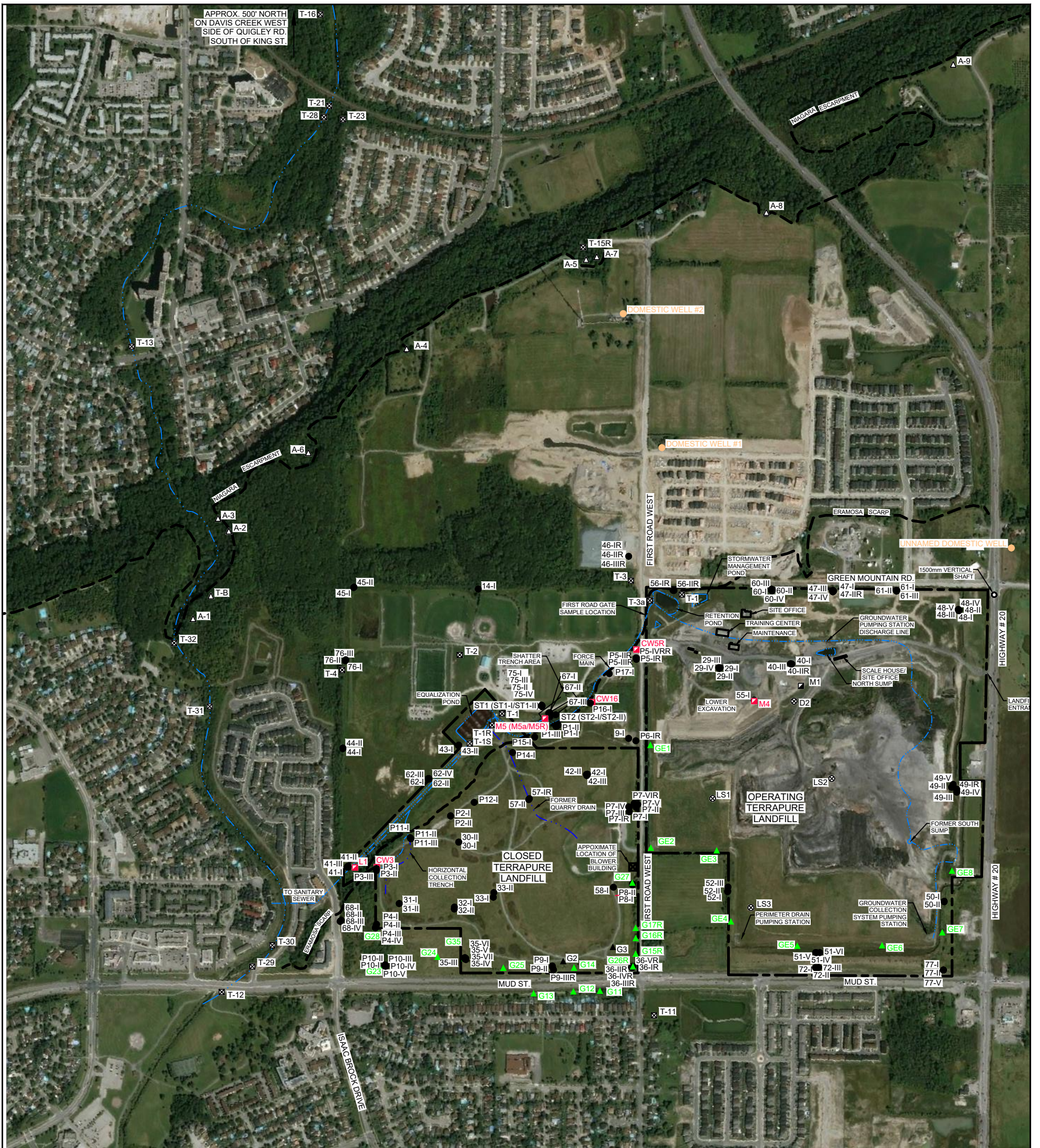


GFL ENVIRONMENTAL
STONEY CREEK REGIONAL FACILITY
2021 ANNUAL MONITORING REPORT

11103232-17
Apr 7, 2021

SITE LOCATION

FIGURE 1.1

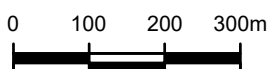


LEGEND

- — — — — PROPERTY BOUNDARY
- x — — — FENCE
- ····· CREEK AND DRAINAGE POND
- — — — — ESCARPMENT
- ····· FORMER QUARRY DRAIN
- 44-I MONITORING WELL LOCATION
- DOMESTIC WELL #1 PRIVATE MONITORING WELL LOCATION
- CW16 CONTAINMENT WELL
- ▲ G27 GAS MONITORING LOCATION
- △ A-3 HISTORICAL SEEP LOCATIONS
- ⊠ T-1 SURFACE WATER MONITORING STATION
- ⊗ LS3 MONITOR/MONITORING CHAMBER



Source: Microsoft Product Screen Shot(s) Reprinted with permission from Microsoft Corporation, Accessed: 2018; Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.



Coordinate System:
UTM83-17

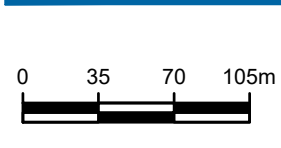
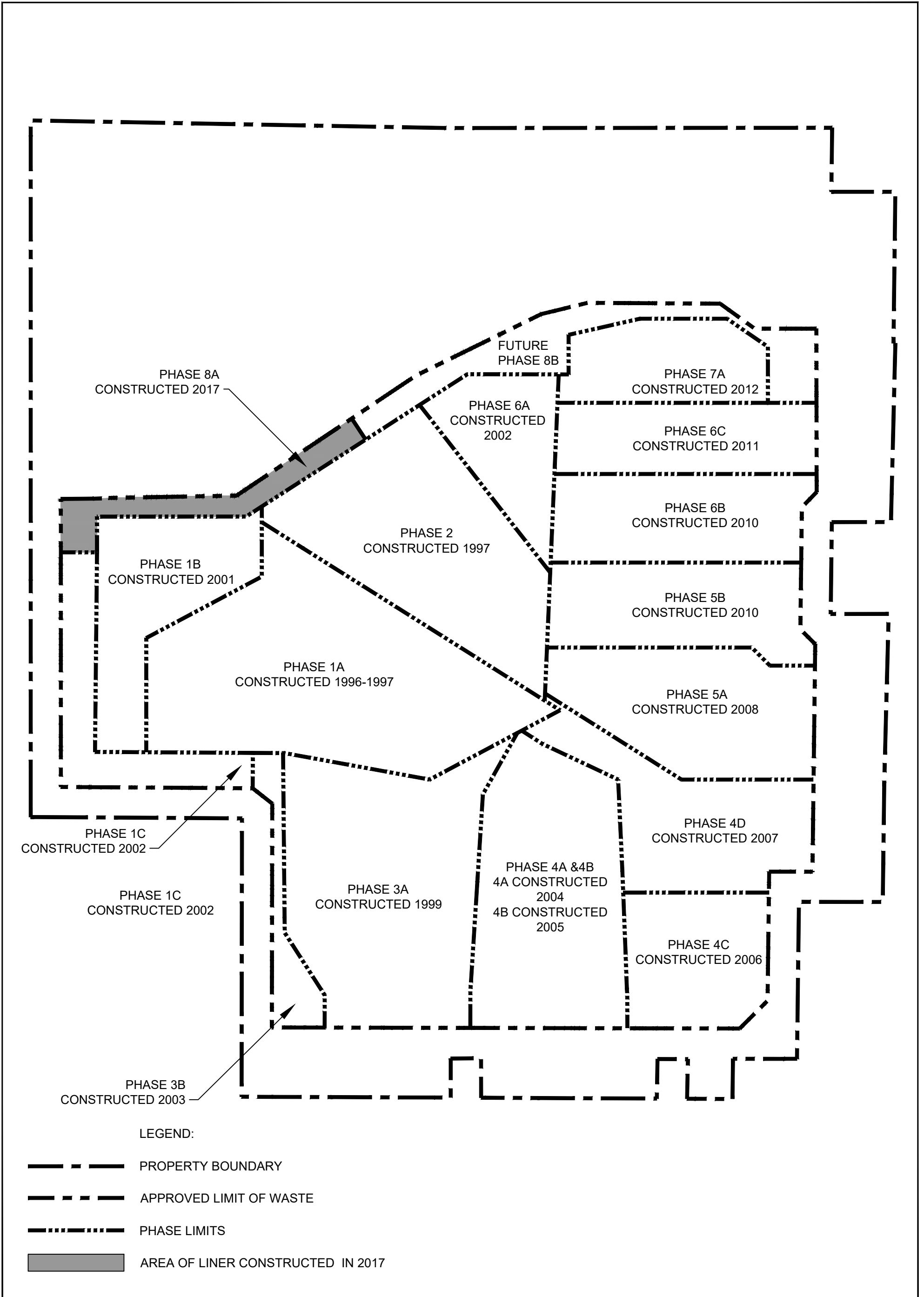


**GFL ENVIRONMENTAL
STONEY CREEK REGIONAL FACILITY
2021 ANNUAL MONITORING REPORT**

SITE PLAN

11103232
Jun 27, 2022

FIGURE 1.2

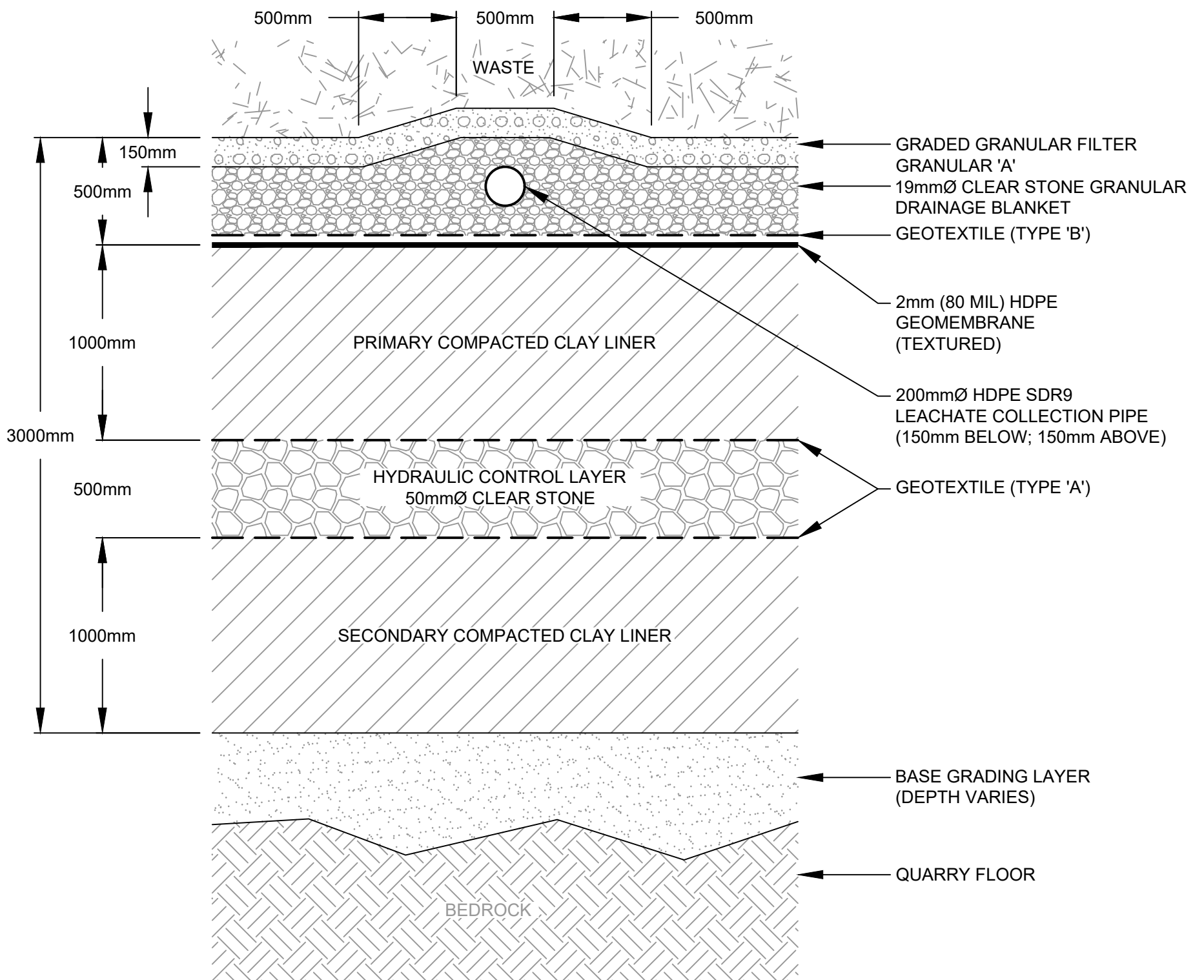


GFL ENVIRONMENTAL
 STONEY CREEK REGIONAL FACILITY
 2021 ANNUAL MONITORING REPORT

11103232
 June 27, 2022

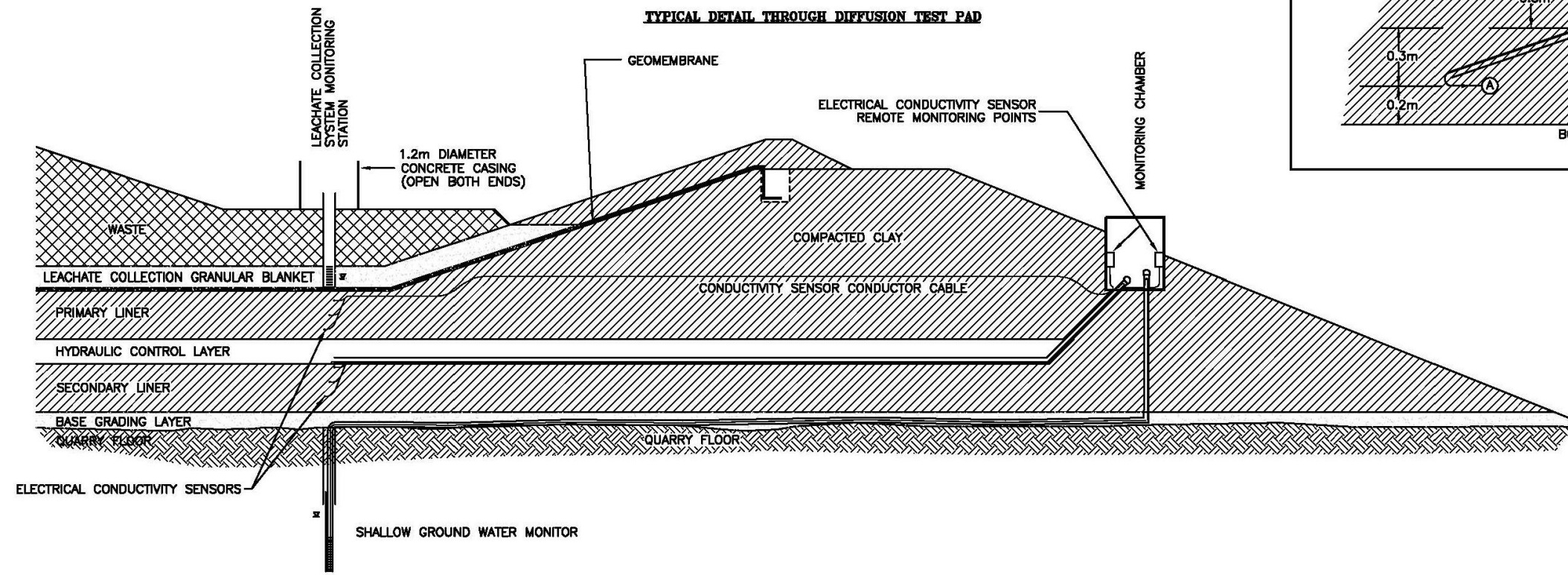
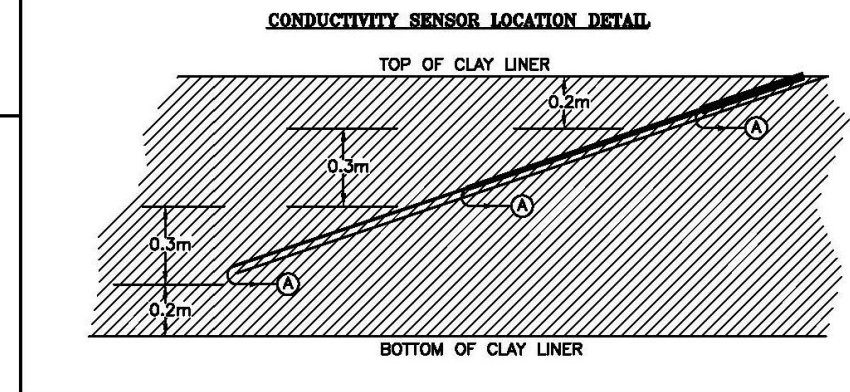
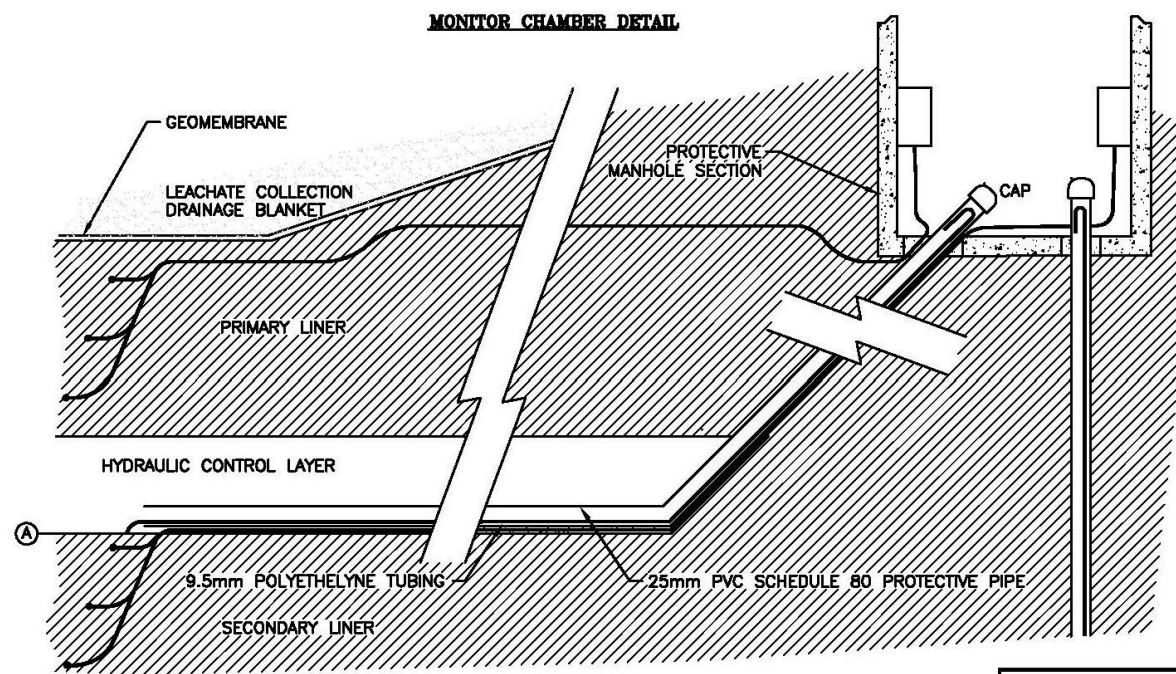
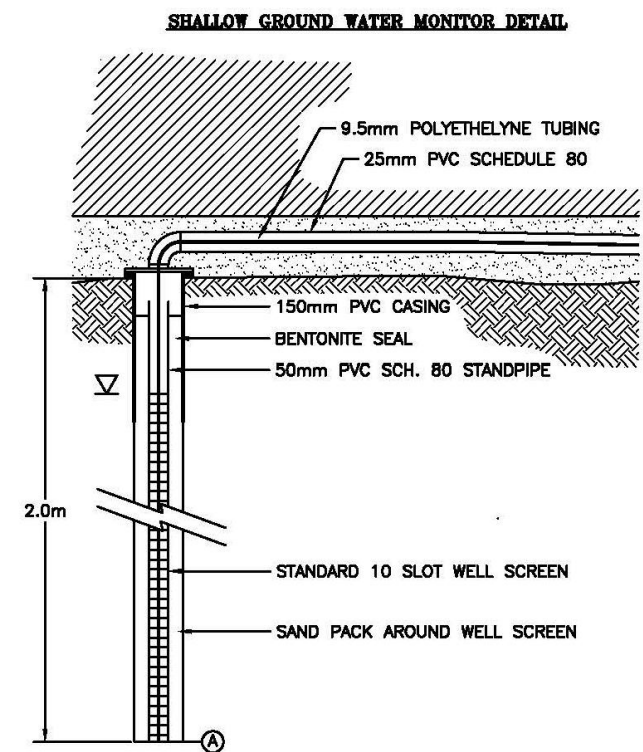
LAYOUT OF LANDFILL PHASES

FIGURE 3.1

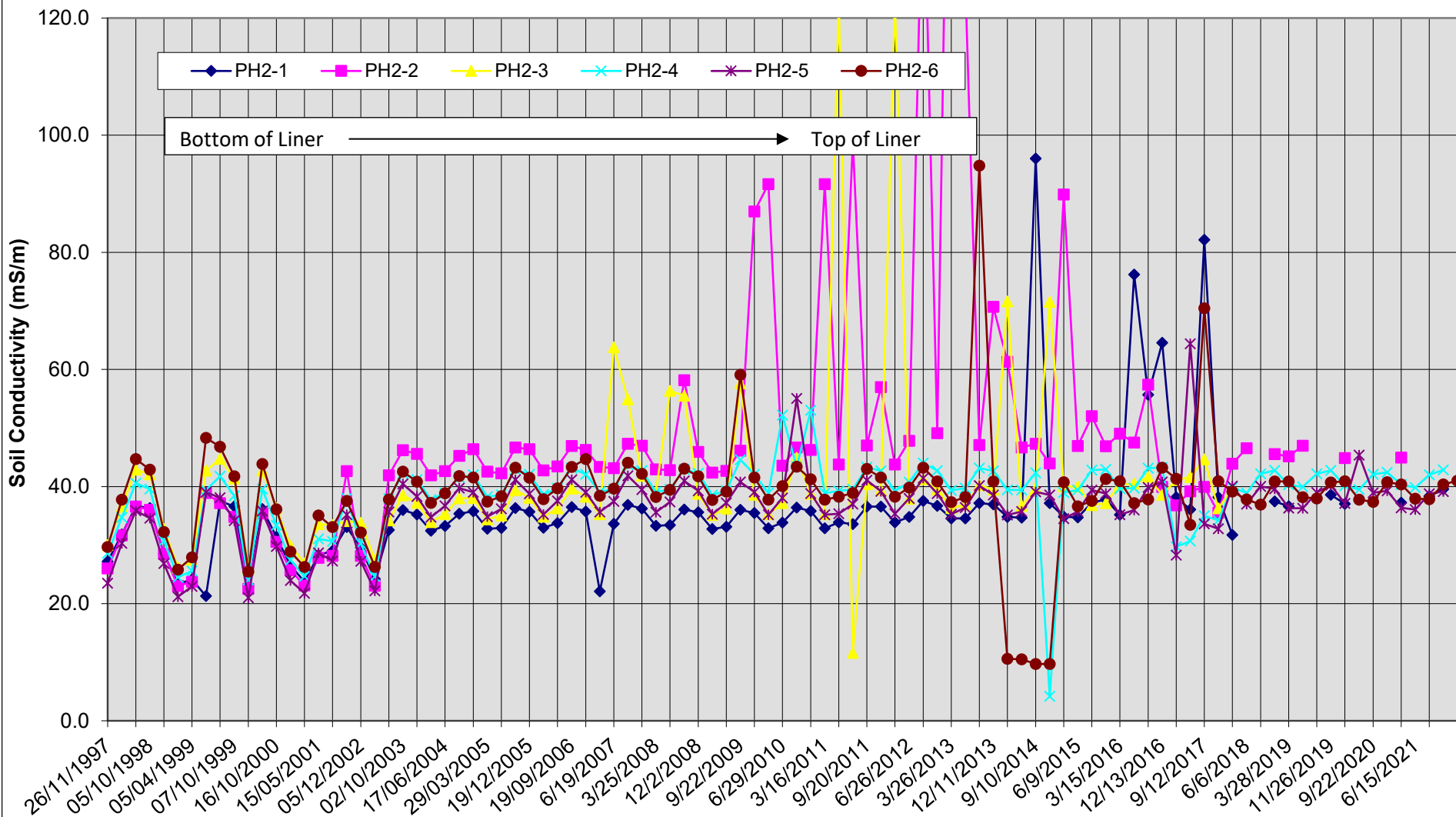


TYPICAL CROSS SECTION THROUGH BASE LINER SYSTEM





Primary Liner

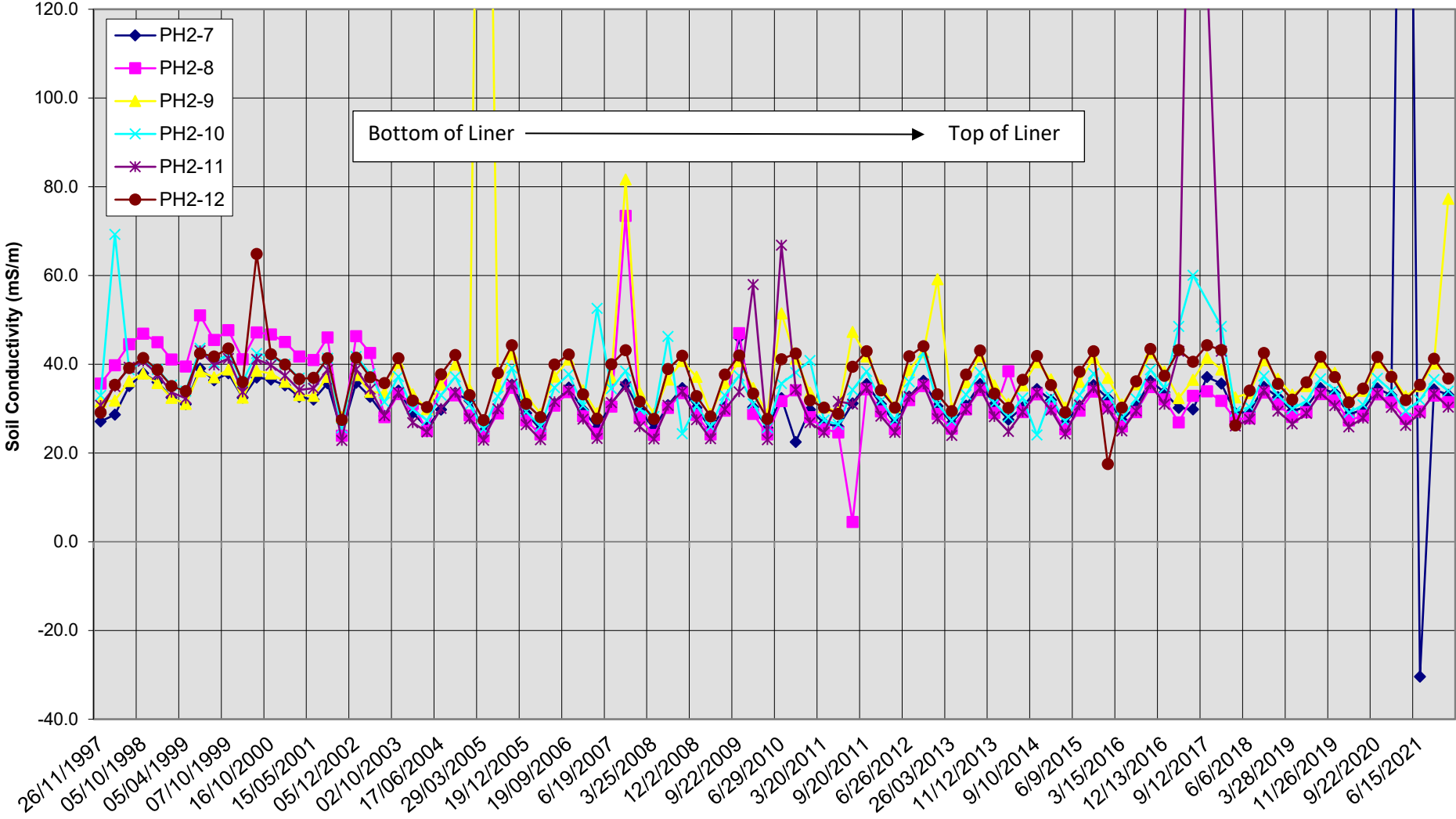


GFL Environmental Operating Stoney Creek Regional Facility
Annual Monitoring Report 2021

PHASE 2 LINER SOIL ELECTRICAL CONDUCTIVITY TRENDS

Figure 3.4a

Secondary Liner



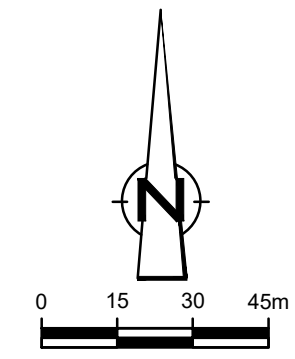
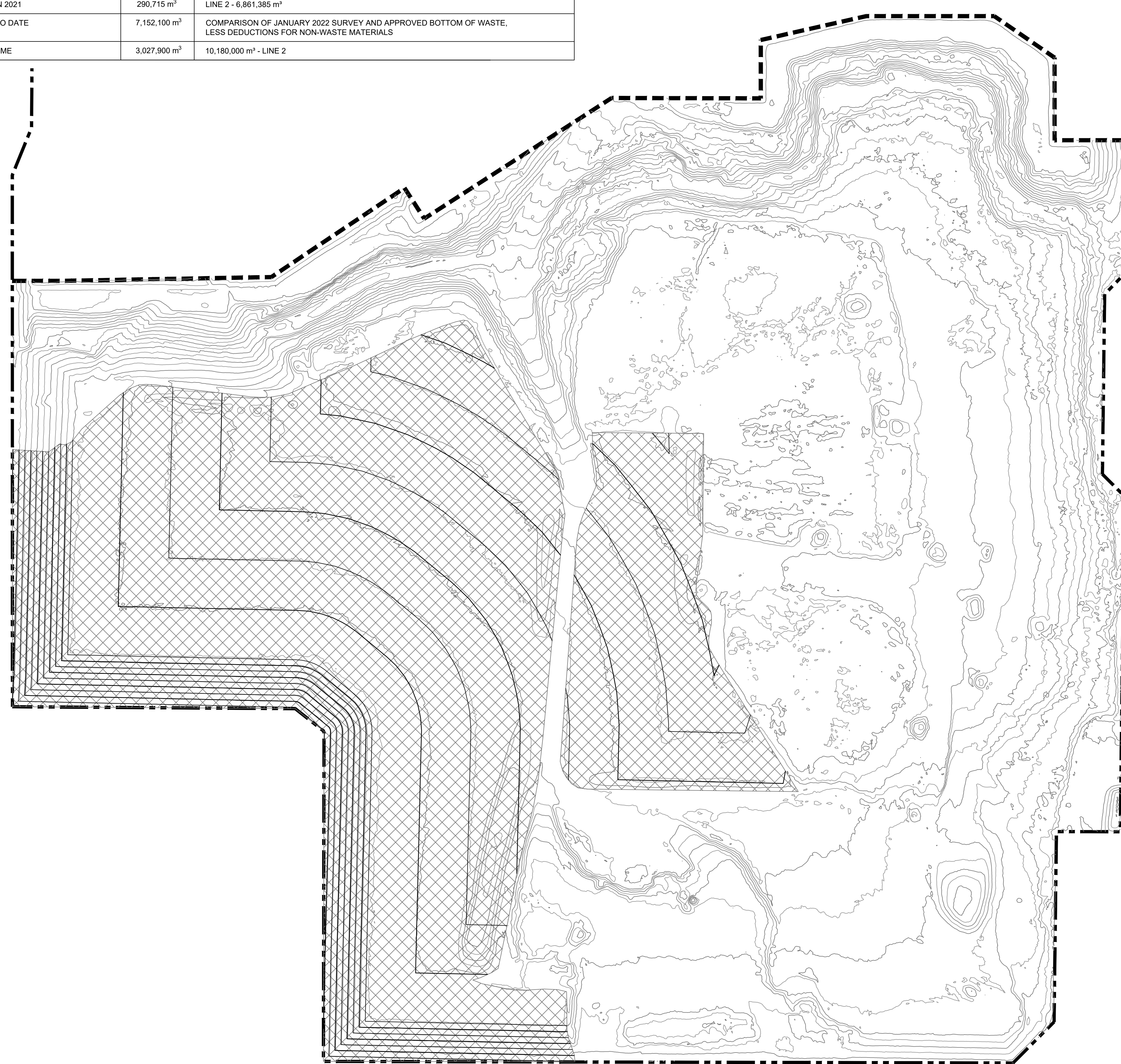
GFL Environmental Operating Stoney Creek Regional Facility
 2021 Annual Monitoring Report

PHASE 2 LINER SOIL ELECTRICAL CONDUCTIVITY TRENDS

Figure 3.4b

STONEY CREEK LANDFILL VOLUMES

LINE	ITEM	QUANTITY	NOTES
1	TOTAL VOLUME OF WASTE PLACED IN 2021	290,715 m ³	LINE 2 - 6,861,385 m ³
2	TOTAL VOLUME OF WASTE PLACED TO DATE	7,152,100 m ³	COMPARISON OF JANUARY 2022 SURVEY AND APPROVED BOTTOM OF WASTE, LESS DEDUCTIONS FOR NON-WASTE MATERIALS
3	ESTIMATED REMAINING WASTE VOLUME	3,027,900 m ³	10,180,000 m ³ - LINE 2



- LEGEND:**
- EXISTING MAJOR CONTOUR (2m INTERVAL)
 - EXISTING MINOR CONTOUR (1m INTERVAL)
 - EXISTING FINAL COVER MAJOR CONTOUR (2m INTERVAL)
 - EXISTING FINAL COVER MINOR CONTOUR (1m INTERVAL)
 - FINAL COVER AREA
 - PROPERTY BOUNDARY
 - LIMIT OF LINER

SOURCE:
 TOPOGRAPHICAL SURVEY INFORMATION BASED ON AERIAL PHOTOGRAPHY DATED JANUARY 14, 2022 BY AUTOMATED ENGINEERING TECHNOLOGIES.

REGIONAL MUNICIPALITY OF HAMILTON
 WENTWORTH BENCHMARK 75U169
 (N) 813.300, (E) 999.000, ELEVATION = 204.228 mASL.

NOTE:
 PHASES '1A', '2' AND '1B' WERE DESIGNED USING BENCHMARK (ELEVATION 204.337 mASL).
 PHASES '1C', '3A', '3B', '4' AND '6A' WERE DESIGNED USING BENCHMARK AS SHOWN (ELEVATION = 204.228mASL).

REGIONAL MUNICIPALITY OF HAMILTON WENTWORTH
 BENCHMARK 75U169
 IRON PIPE WITH BRASS CAP, ALONG FIRST ROAD WEST, 0.2Km NORTH OF INTERSECTION WITH MUD STREET, 1.0 Km WEST OF HWY #20, 14.3m NORTH OF CENTER LINE OF DRIVEWAY TO HOUSE, 8.2m EAST OF CENTER LINE OF ROAD, 9cm WEST OF BENCHMARK SIGN POST, 1m ABOVE ROAD LEVEL, ELEVATION 204.228mASL.



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Client
GFL Environmental
STONEY CREEK, ONTARIO

Project
STONEY CREEK REGIONAL FACILITY
2021 ANNUAL MONITORING REPORT

No.	Issue	Drawn	Approved	Date

Drawn	T.WAGSTAFF	Designer	B.DERMODY
Drafting Check	P.LESIECZKO	Design Check	B.DERMODY
Project Manager	B.DERMODY	Date	JANUARY 2022

This document shall not be used for construction unless signed and sealed for construction.

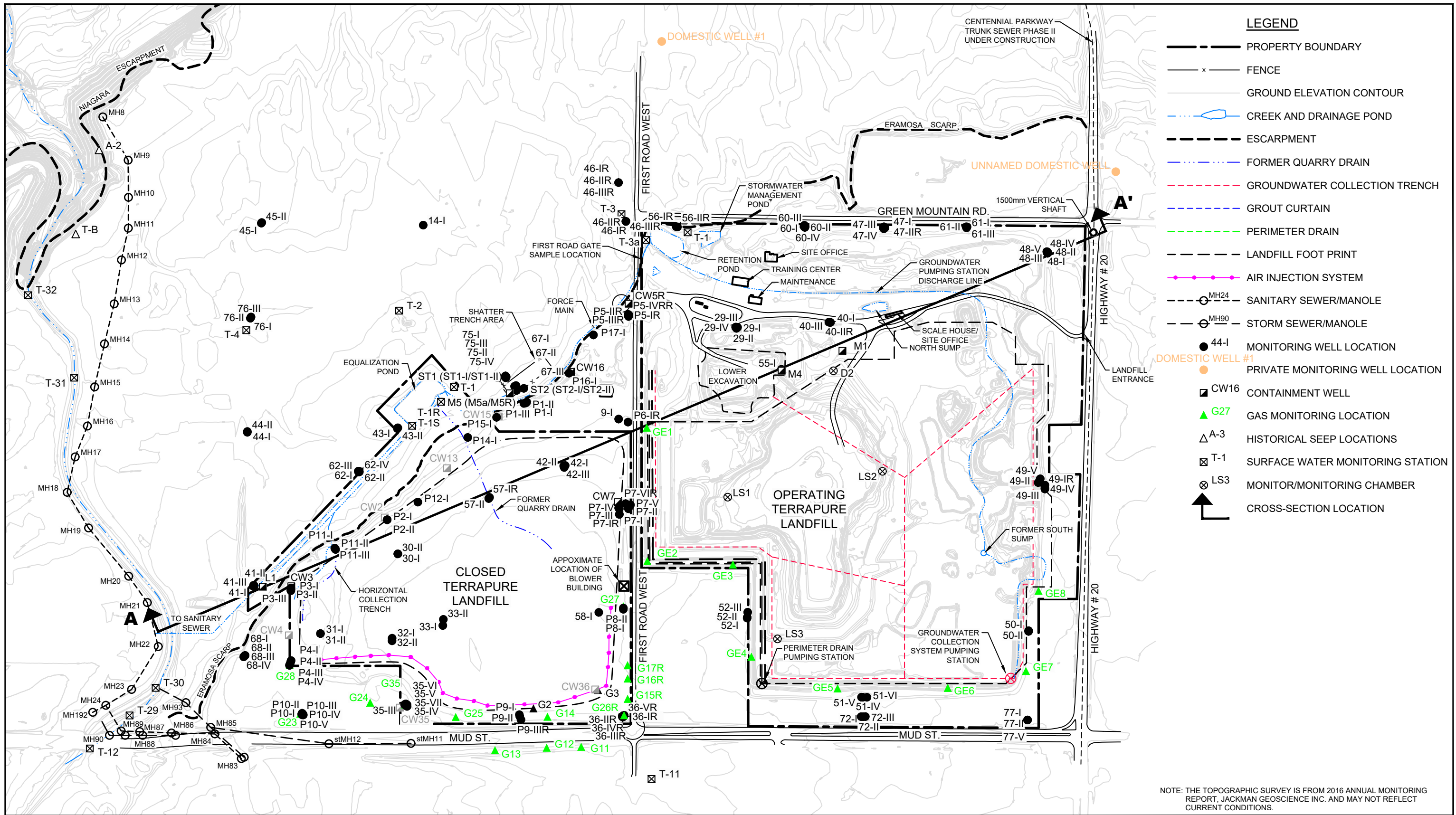
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ANSI D

Scale 1:1500
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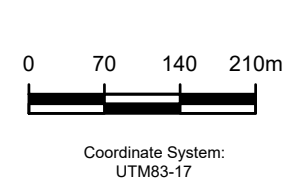
Project No. 11103232-41

Title
LANDFILL CONTOURS AND VOLUMES - JANUARY 2022

Sheet No.
FIGURE 3.5



Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.

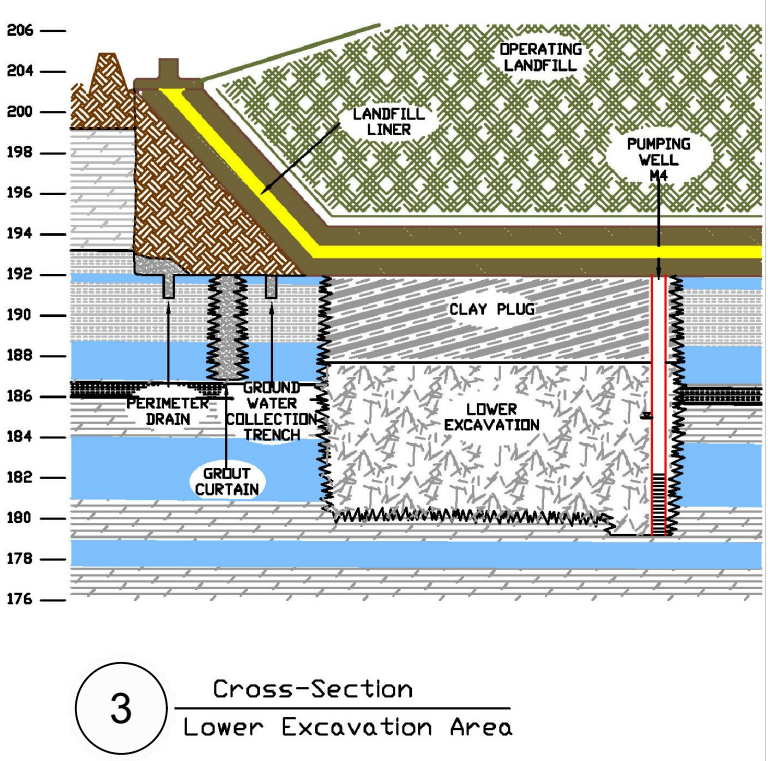
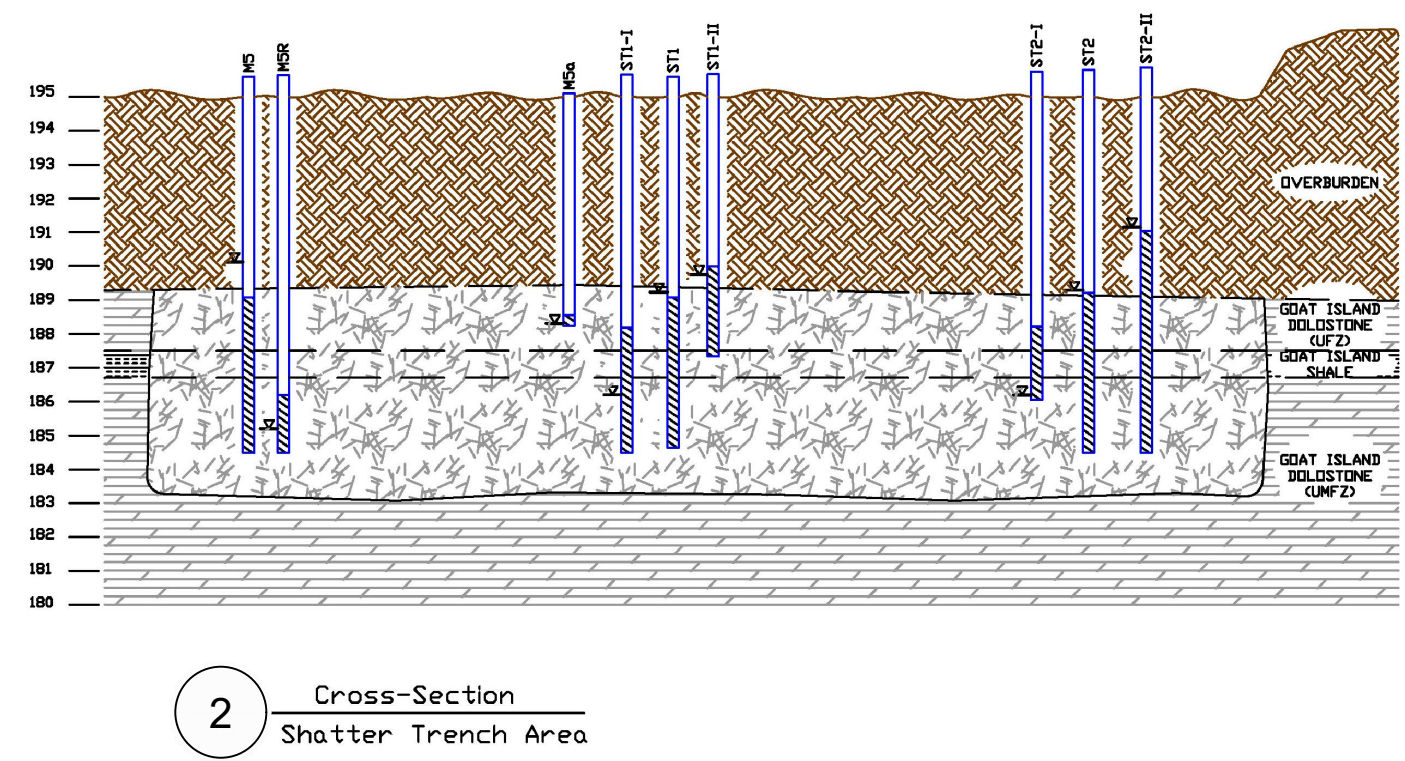
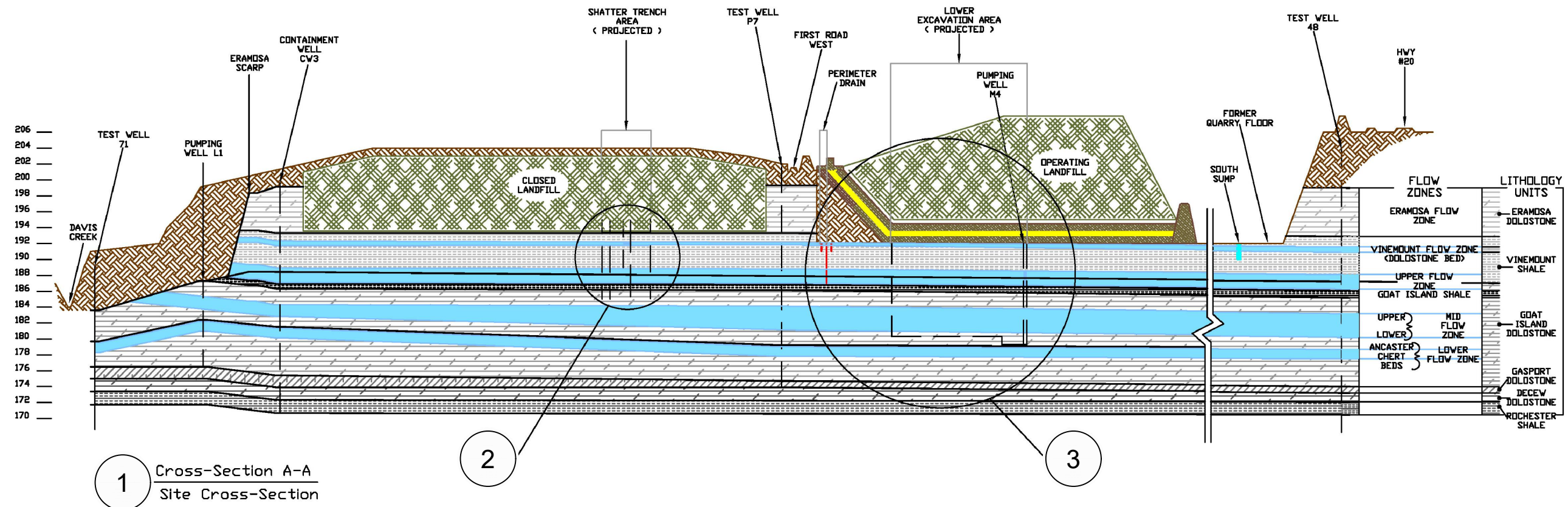


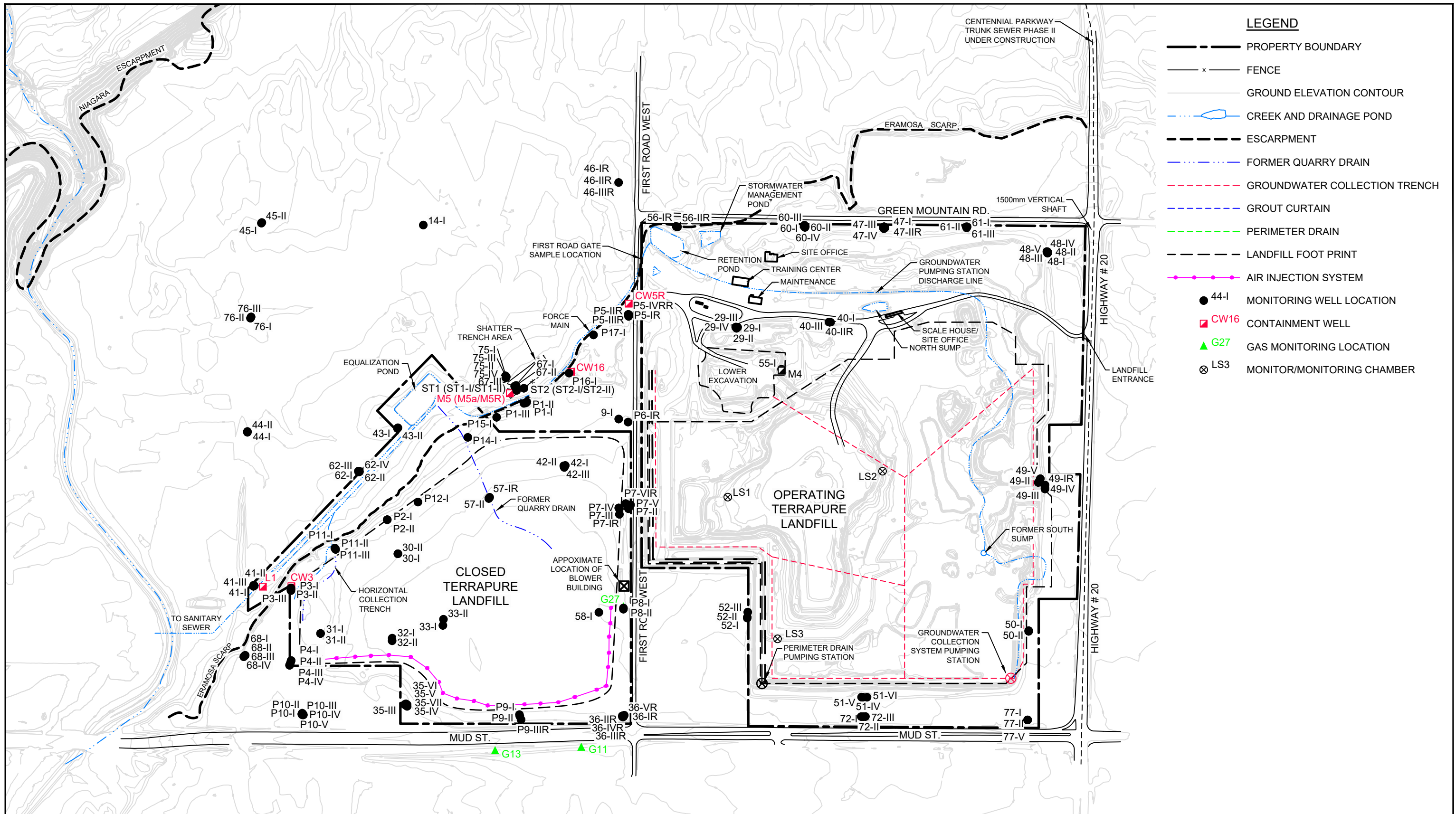
GFL ENVIRONMENTAL
 STONEY CREEK REGIONAL FACILITY
 2021 ANNUAL MONITORING REPORT

SITE FEATURES & CROSS-SECTION LOCATION

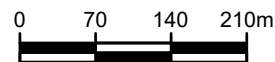
11103232
 Jun 27, 2022

FIGURE 4.1





Source: Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.



Coordinate System:
UTM83-17



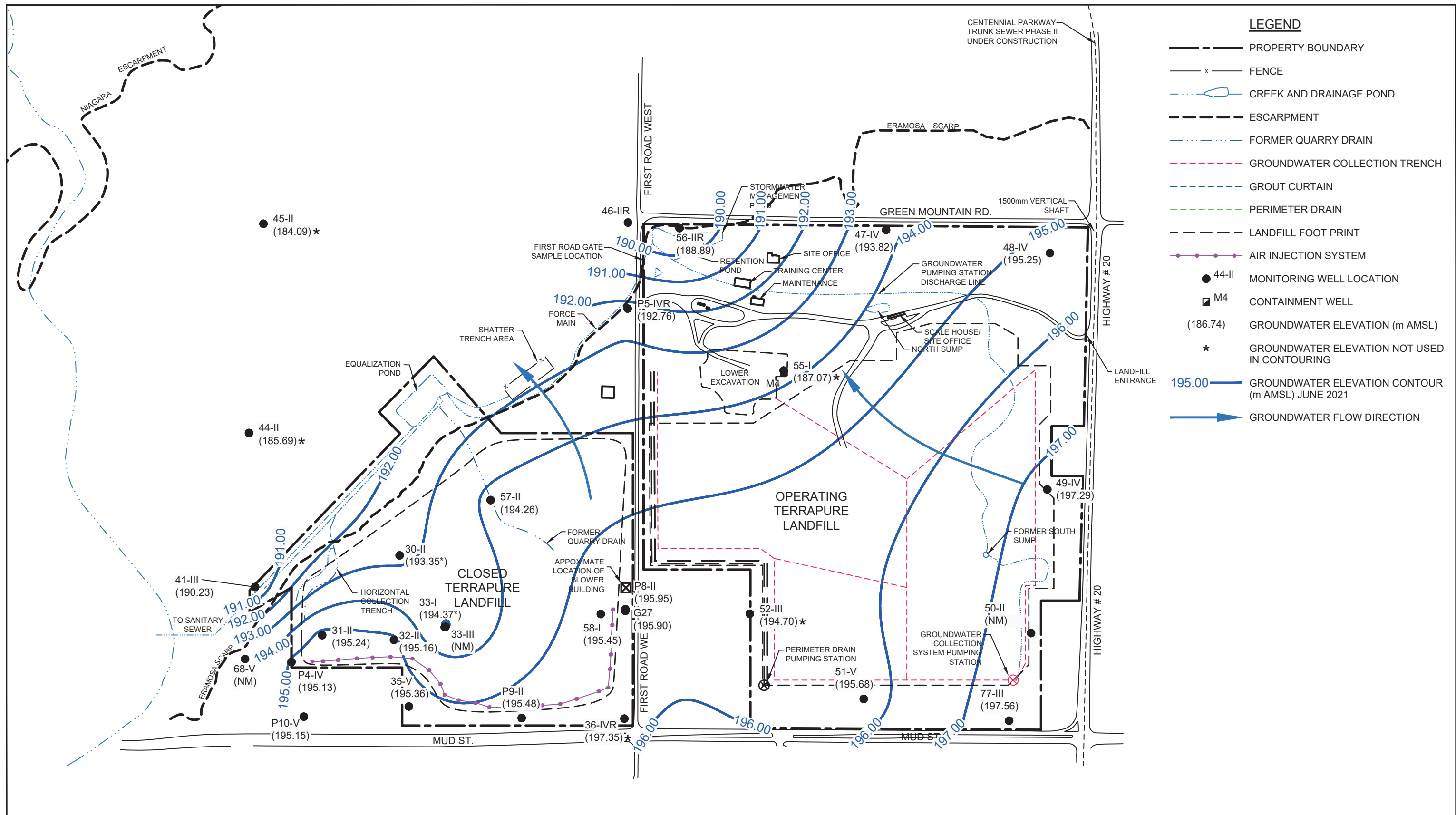
GFL ENVIRONMENTAL
STONEY CREEK REGIONAL FACILITY
2021 ANNUAL MONITORING REPORT

11103232

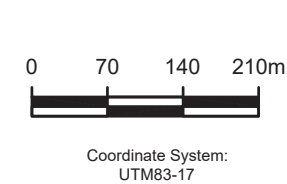
Jun 24, 2022

CURRENT GROUNDWATER MONITORING LOCATIONS

FIGURE 4.3



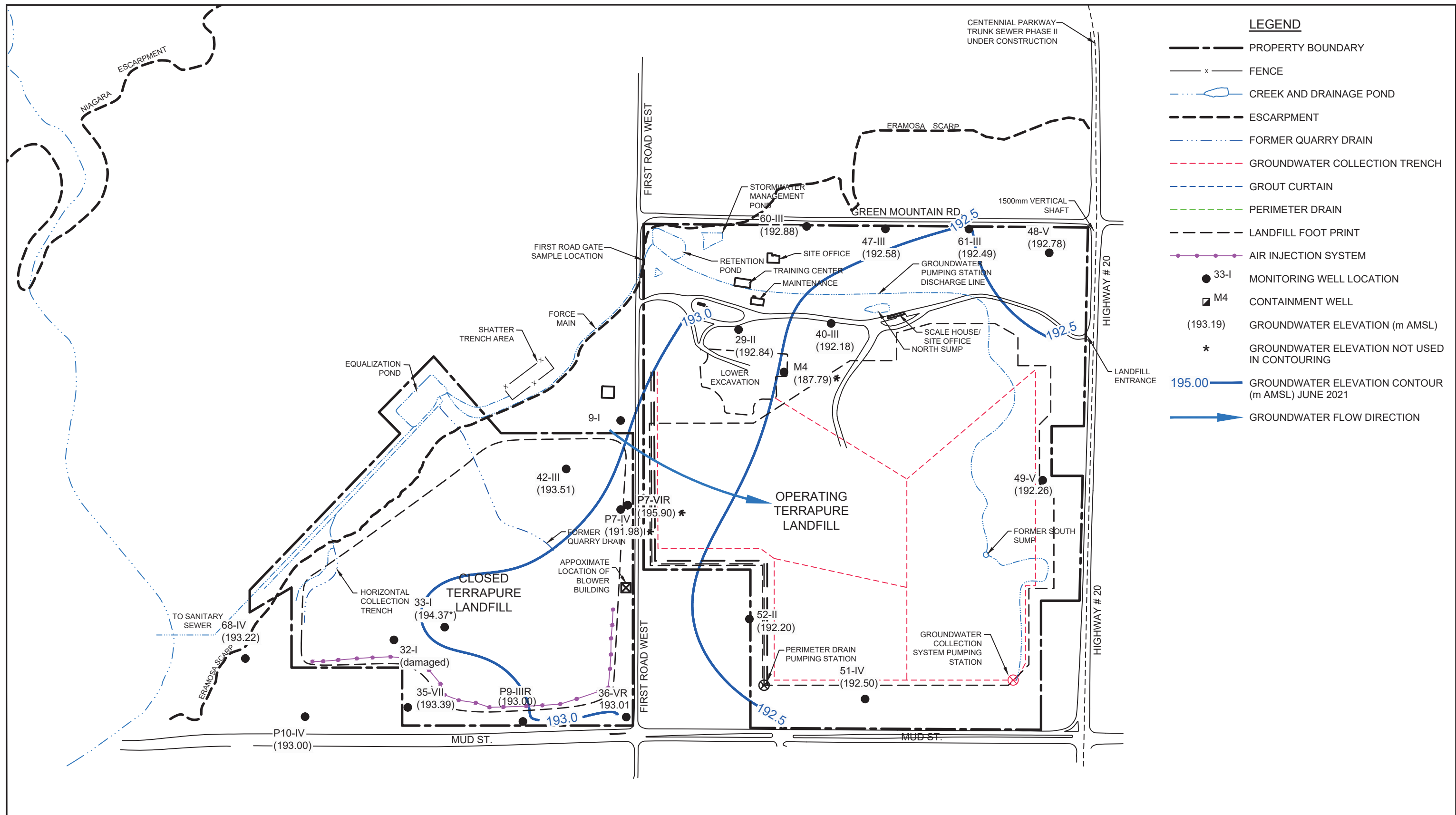
Source: Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.



GFL ENVIRONMENTAL
 STONEY CREEK REGIONAL FACILITY
 2021 ANNUAL MONITORING REPORT
 INTERPRETED SHALLOW/ERAMOSA GROUNDWATER FLOW
 JUNE 2021

11103232
 Jun 27, 2022

FIGURE 4.4A



Source: Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.

0 70 140 210m



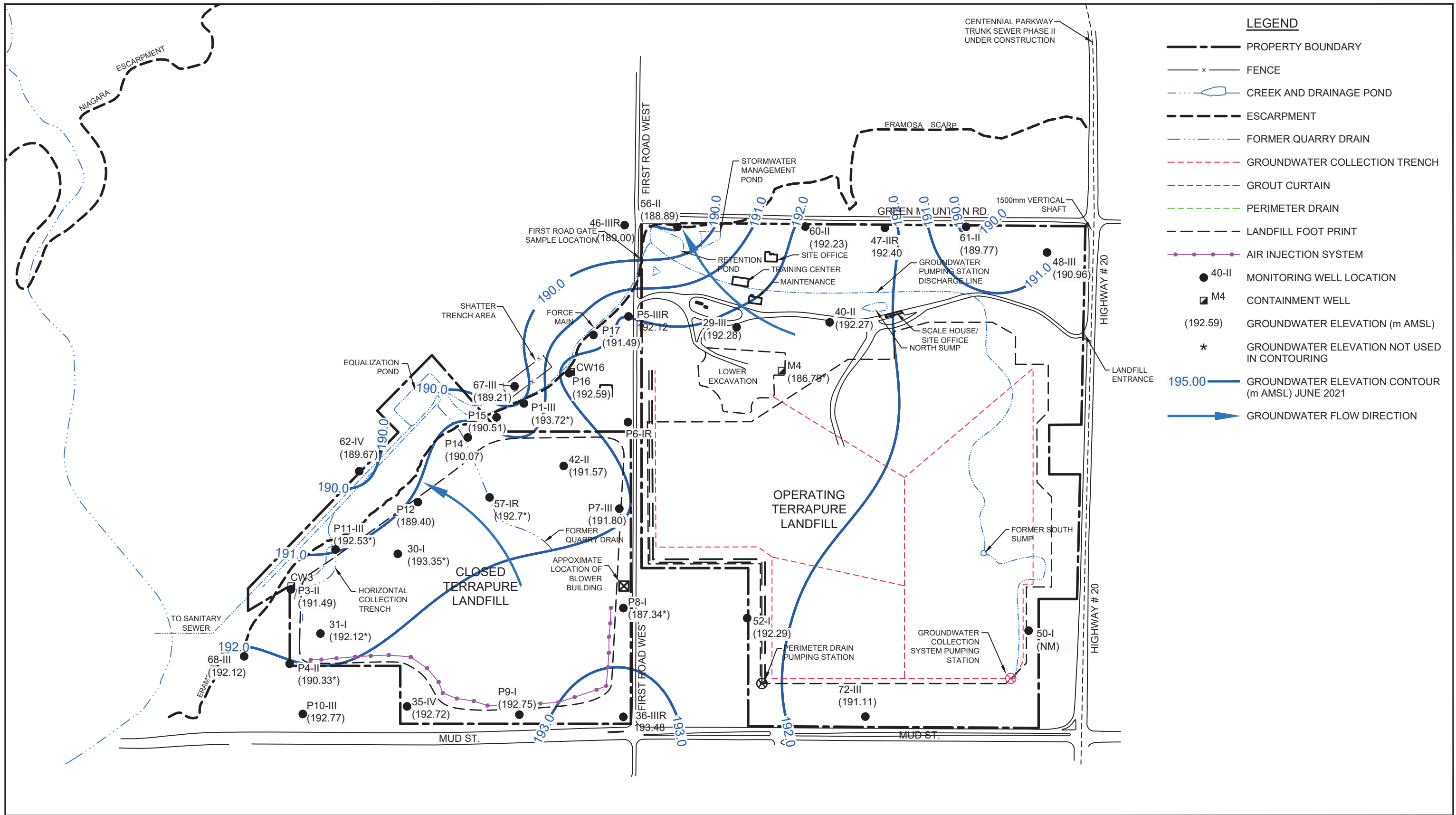
Coordinate System:
UTM83-17



GFL ENVIRONMENTAL
 STONEY CREEK REGIONAL FACILITY
 2021 ANNUAL MONITORING REPORT
 INTERPRETED VINEMOUNT FLOW ZONE GROUNDWATER FLOW
 JUNE 2021

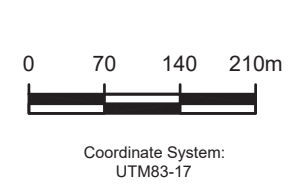
11103232
 Jun 27, 2022

FIGURE 4.4B



- LEGEND**
- x — PROPERTY BOUNDARY
 - x — FENCE
 - CREEK AND DRAINAGE POND
 - ESCARPMENT
 - FORMER QUARRY DRAIN
 - GROUNDWATER COLLECTION TRENCH
 - GROUT CURTAIN
 - PERIMETER DRAIN
 - LANDFILL FOOT PRINT
 - AIR INJECTION SYSTEM
 - 40-II MONITORING WELL LOCATION
 - M4 CONTAINMENT WELL
 - (192.59) GROUNDWATER ELEVATION (m AMSL)
 - * GROUNDWATER ELEVATION NOT USED IN CONTOURING
 - 195.00 GROUNDWATER ELEVATION CONTOUR (m AMSL) JUNE 2021
 - GROUNDWATER FLOW DIRECTION

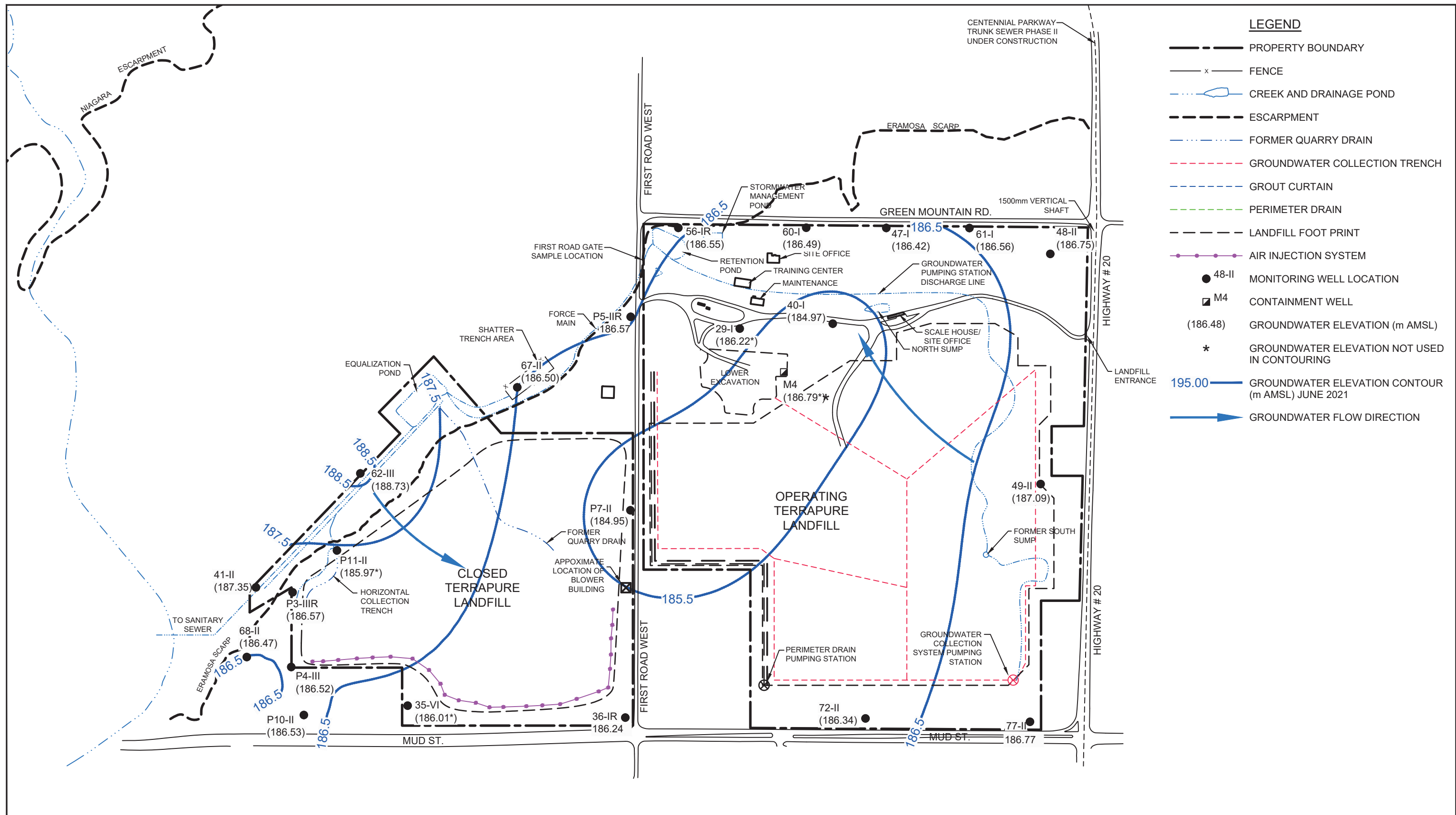
Source: Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.



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 JUNE 2021

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FIGURE 4.4C



Source: Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.

0 70 140 210m

Coordinate System:
UTM83-17

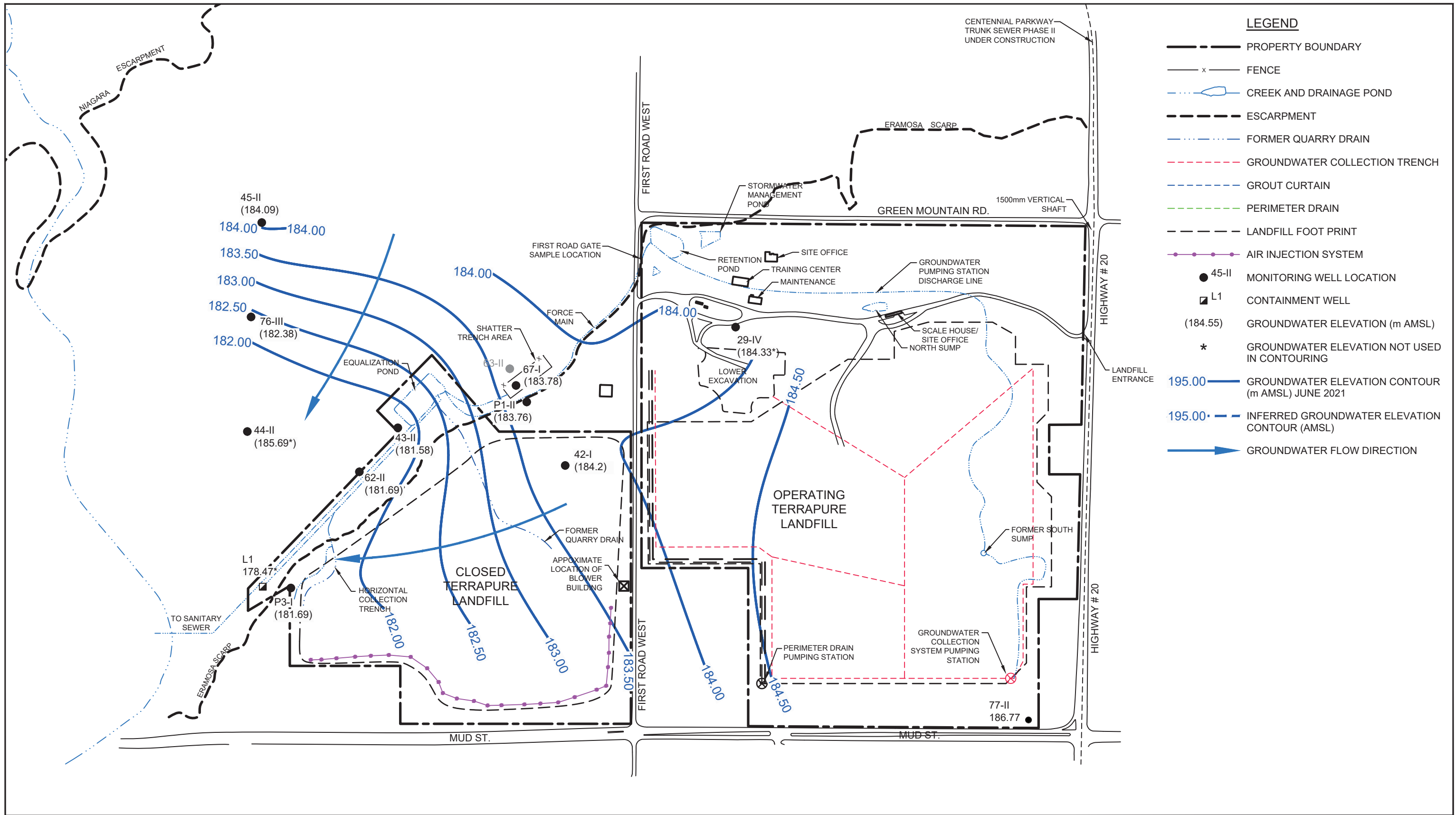


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FIGURE 4.4D



Source: Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.

0 70 140 210m

Coordinate System:
UTM83-17



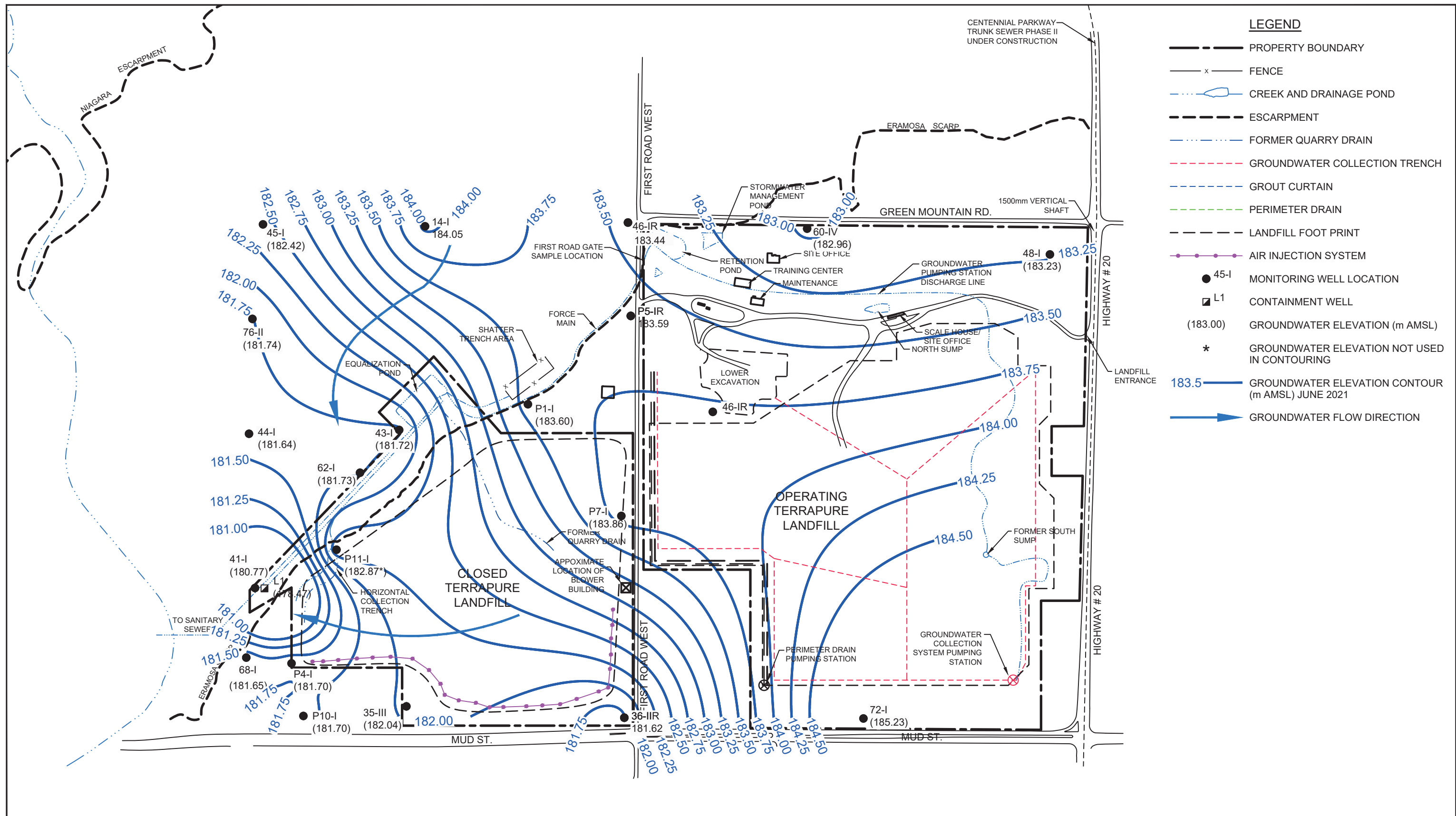
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FIGURE 4.4E



Source: Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.

0 70 140 210m

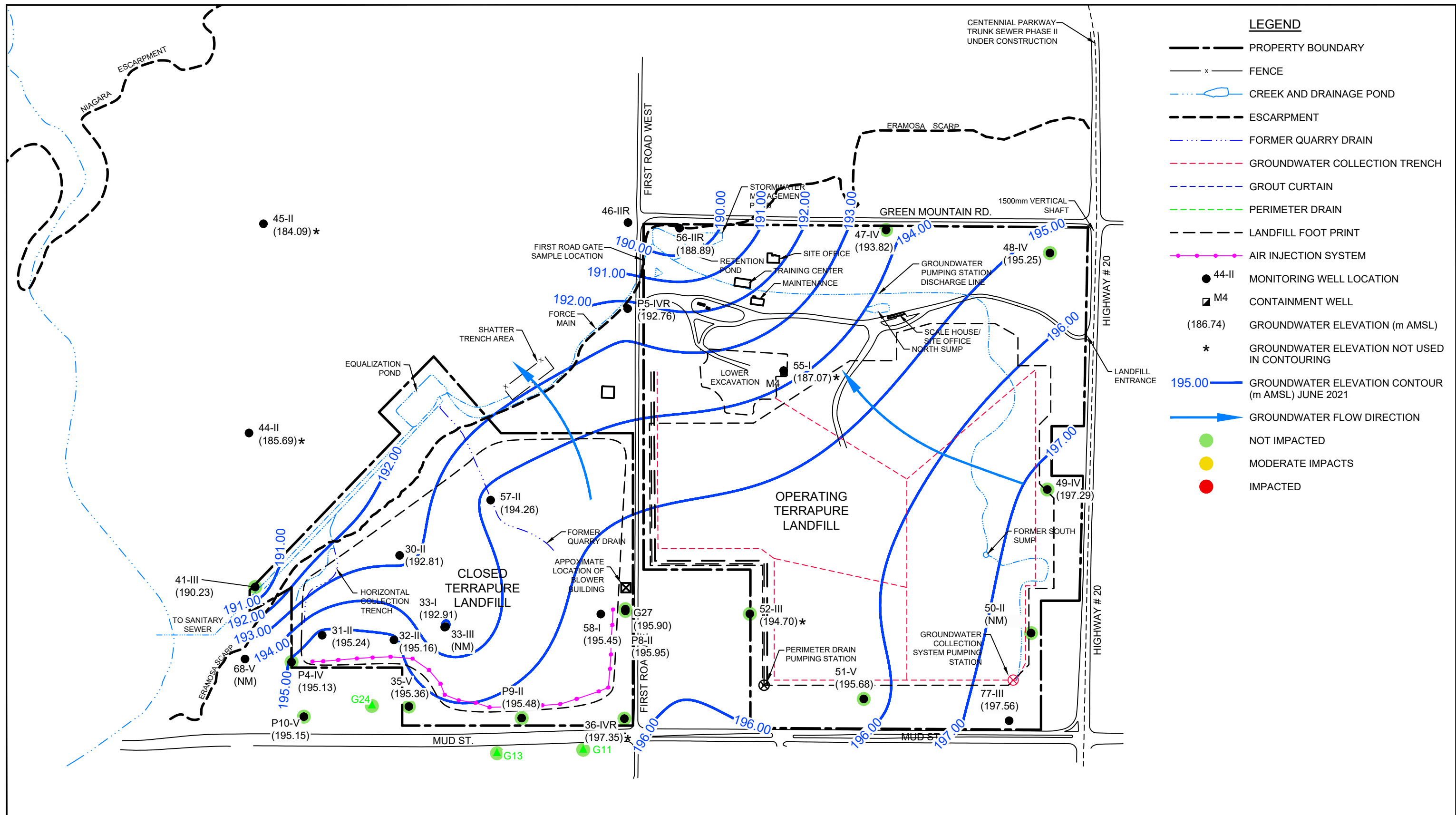
Coordinate System:
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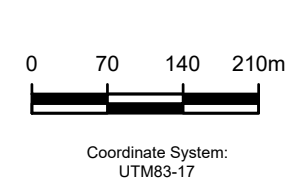
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FIGURE 4.4F



- LEGEND**
- x — PROPERTY BOUNDARY
 - x — FENCE
 - CREEK AND DRAINAGE POND
 - ESCARPMENT
 - FORMER QUARRY DRAIN
 - GROUNDWATER COLLECTION TRENCH
 - GROUT CURTAIN
 - PERIMETER DRAIN
 - LANDFILL FOOT PRINT
 - AIR INJECTION SYSTEM
 - 44-II MONITORING WELL LOCATION
 - M4 CONTAINMENT WELL
 - (186.74) GROUNDWATER ELEVATION (m AMSL)
 - * GROUNDWATER ELEVATION NOT USED IN CONTOURING
 - 195.00 GROUNDWATER ELEVATION CONTOUR (m AMSL) JUNE 2021
 - GROUNDWATER FLOW DIRECTION
 - NOT IMPACTED
 - MODERATE IMPACTS
 - IMPACTED

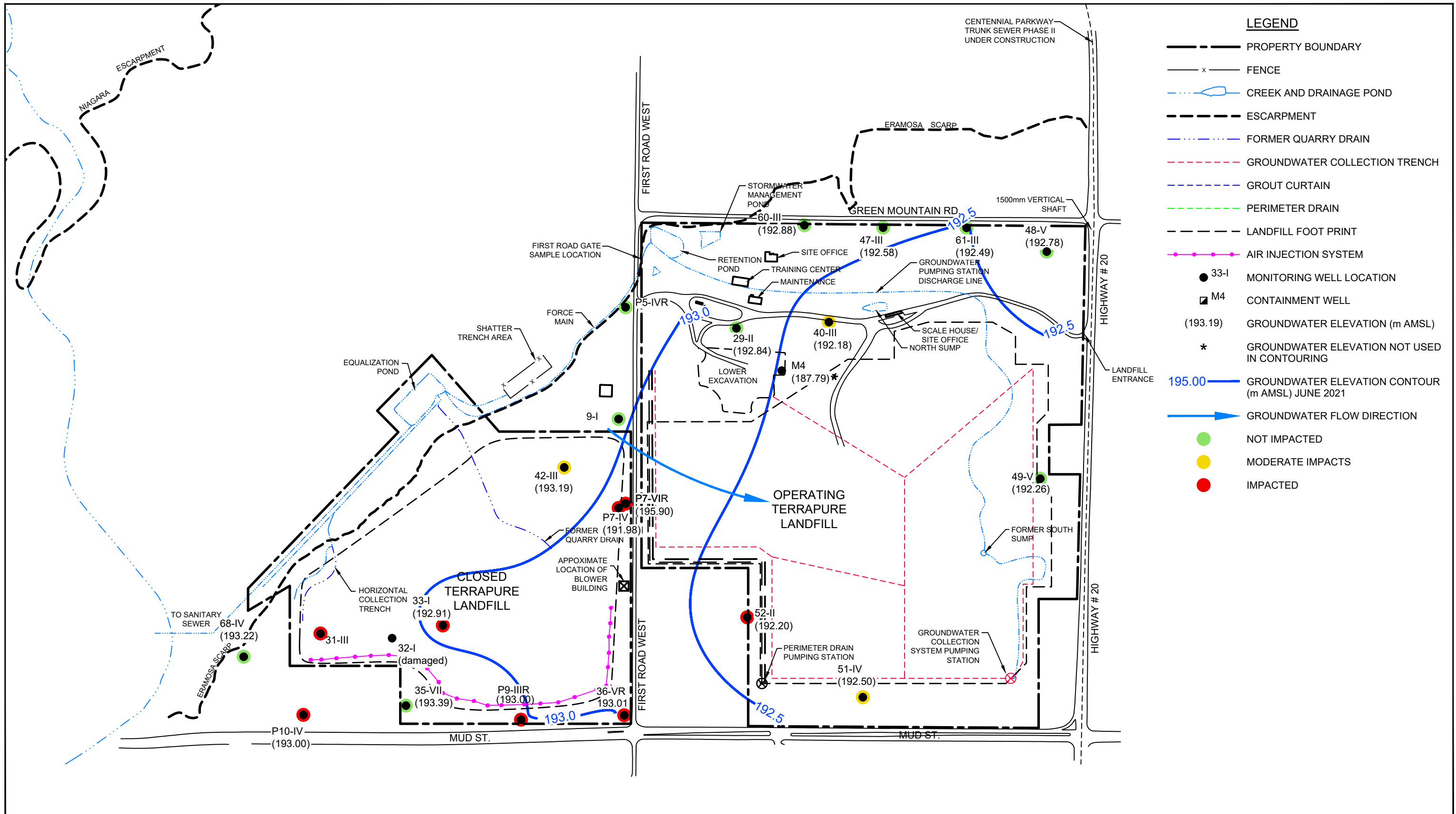
Source: Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.



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 IMPACTS - SHALLOW/ERAMOSA FLOW ZONE

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FIGURE 4.6A



Source: Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.

0 70 140 210m

Coordinate System:
UTM83-17

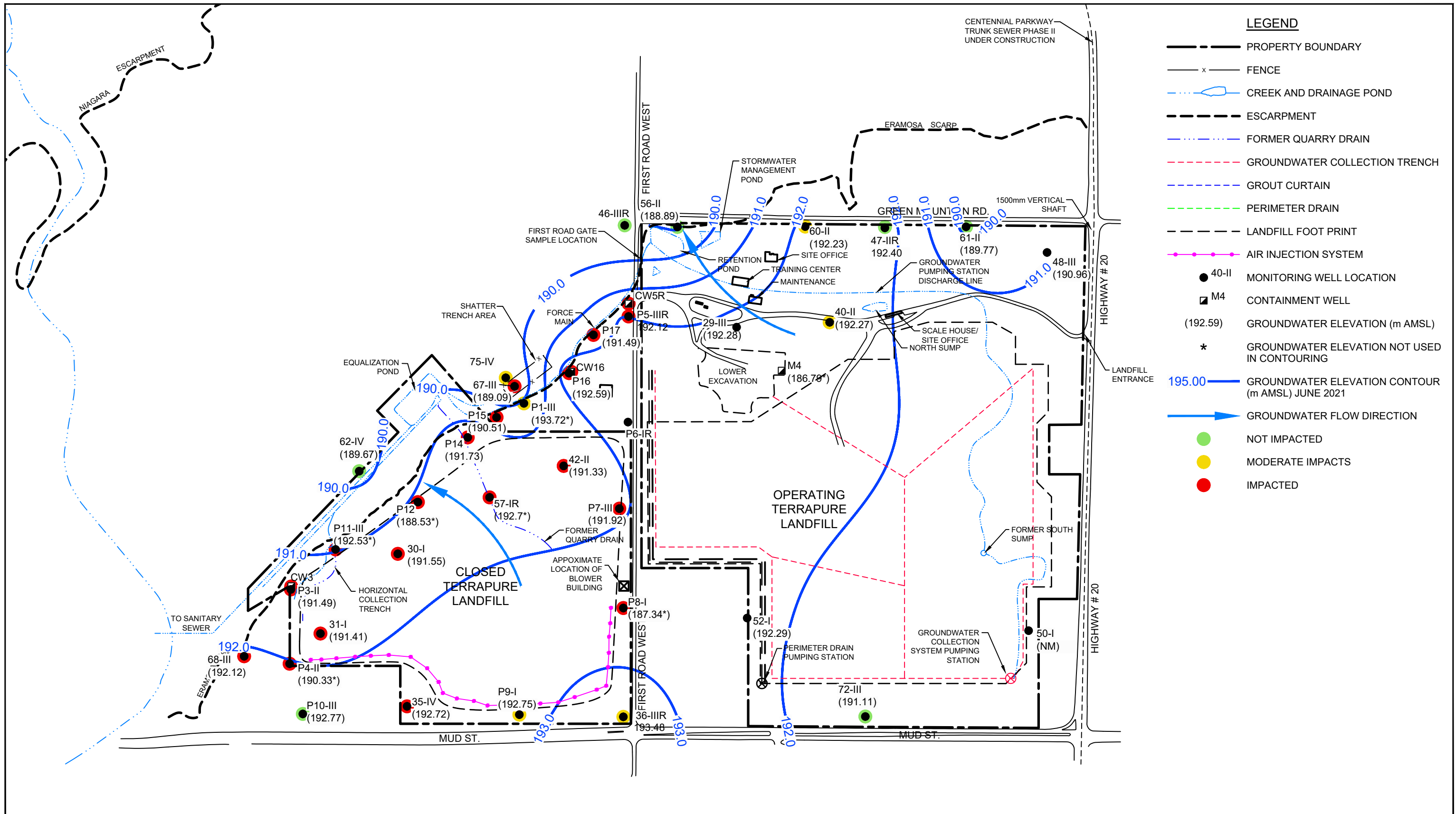


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 IMPACTS - VINEMOUNT FLOW ZONE

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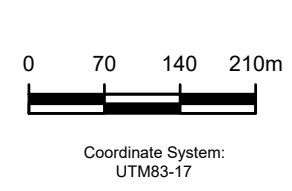
Jun 27, 2022

FIGURE 4.6B



- LEGEND**
- x — PROPERTY BOUNDARY
 - x — FENCE
 - CREEK AND DRAINAGE POND
 - - - ESCARPMENT
 - - - FORMER QUARRY DRAIN
 - - - GROUNDWATER COLLECTION TRENCH
 - - - GROUT CURTAIN
 - - - PERIMETER DRAIN
 - - - LANDFILL FOOT PRINT
 - AIR INJECTION SYSTEM
 - 40-II MONITORING WELL LOCATION
 - M4 CONTAINMENT WELL
 - (192.59) GROUNDWATER ELEVATION (m AMSL)
 - * GROUNDWATER ELEVATION NOT USED IN CONTOURING
 - 195.00 GROUNDWATER ELEVATION CONTOUR (m AMSL) JUNE 2021
 - GROUNDWATER FLOW DIRECTION
 - NOT IMPACTED
 - MODERATE IMPACTS
 - IMPACTED

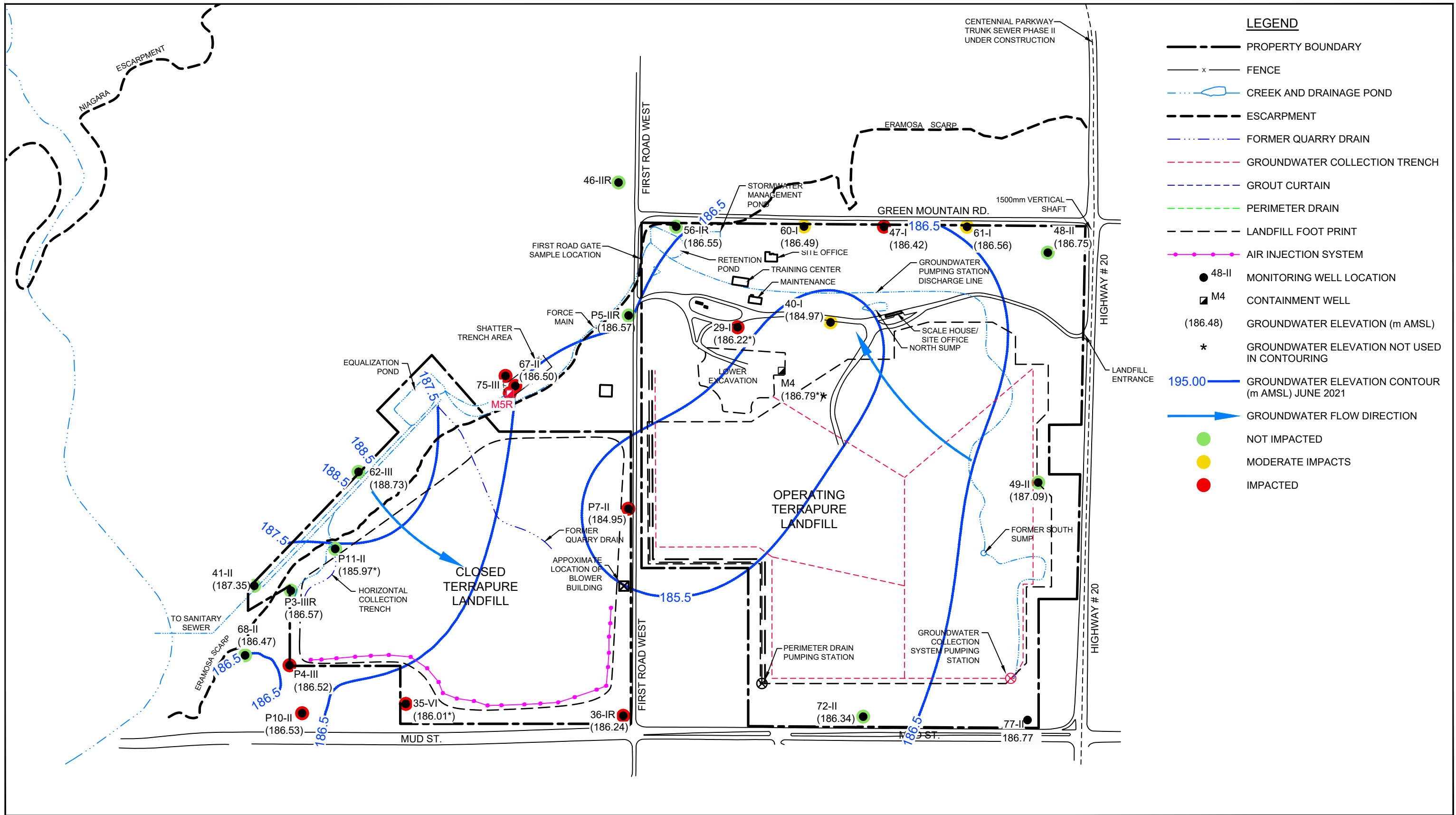
Source: Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.



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 IMPACTS - UPPER FLOW ZONE

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FIGURE 4.6C



Source: Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.

0 70 140 210m

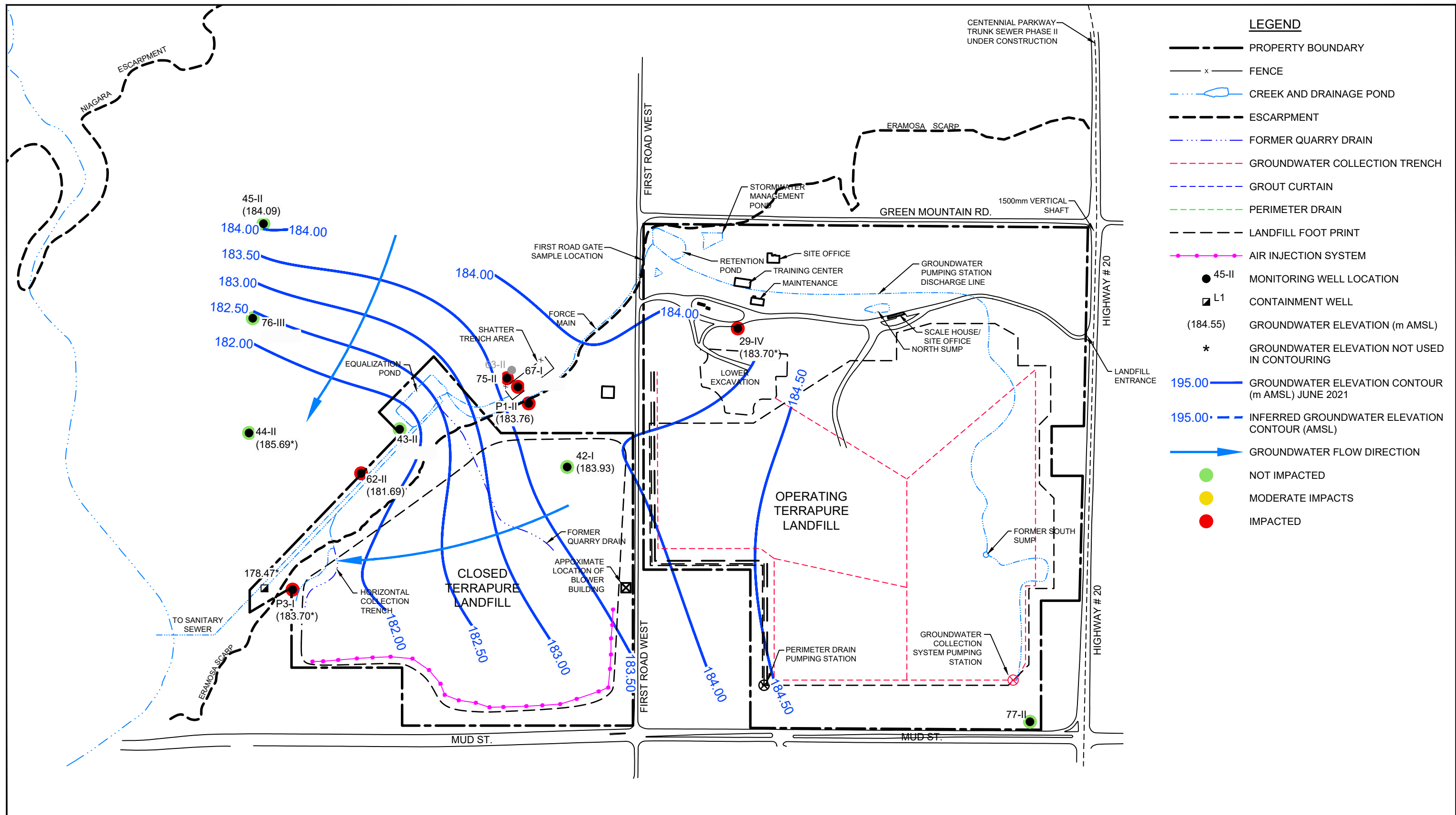
Coordinate System:
UTM83-17



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 IMPACTS - UPPER-MID FLOW ZONE

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FIGURE 4.6D



Source: Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.

0 70 140 210m

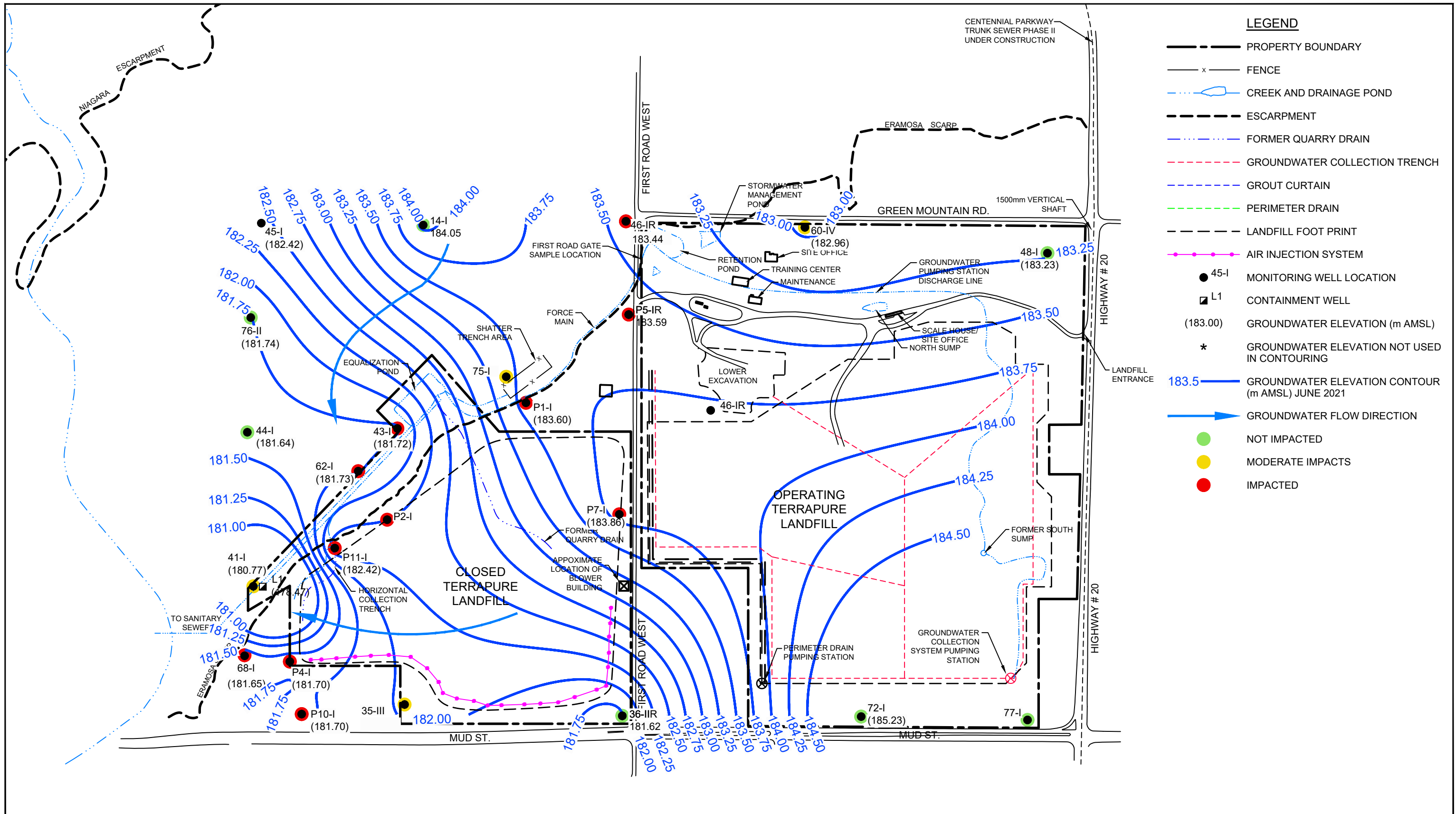
Coordinate System:
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FIGURE 4.6E



Source: Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.

0 70 140 210m

Coordinate System:
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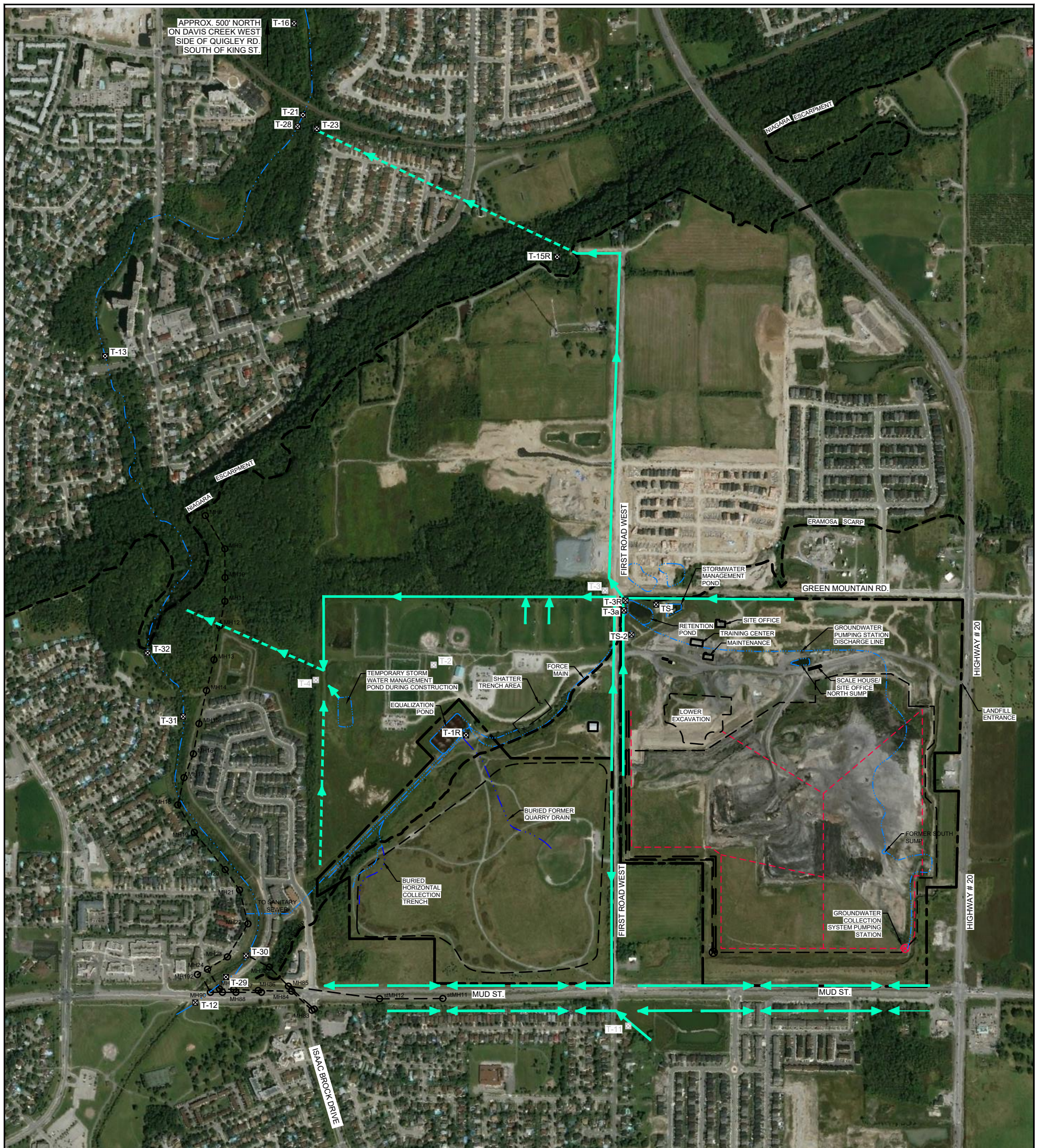


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FIGURE 4.6F



LEGEND

- — — — — PROPERTY BOUNDARY
- x — — — FENCE
- ····· CREEK AND DRAINAGE POND
- — — — — ESCARPMENT
- ····· FORMER QUARRY DRAIN
- — — — — LANDFILL FOOT PRINT
- - - - - GROUNDWATER COLLECTION TRENCH
- - - - - GROUT CURTAIN
- - - - - PERIMETER DRAIN
- ○ — — — SANITARY SEWER/MANOLE
- ○ — — — STORM SEWER/MANOLE
- ⊗ T-1 SURFACE WATER MONITORING STATION
- △ A-3 HISTORICAL SEEP LOCATIONS
- ⊗ T-1 ELIMINATED SURFACE WATER MONITORING STATION
- ⊗ LS3 MONITOR/MONITORING CHAMBER
- DRAINAGE DITCH / SWALE FLOW
- - - - - UNDEFINED DRAINAGE CHANNEL FLOW



Source: Microsoft Product Screen Shot(s) Reprinted with permission from Microsoft Corporation, Accessed: 2018; Base taken from 2016 Annual Monitoring Report, Jackman Geoscience Inc.



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SURFACE WATER FEATURES AND MONITORING STATIONS **FIGURE 4.7**